ARMED FORCES CHEMICAL JOURNAL

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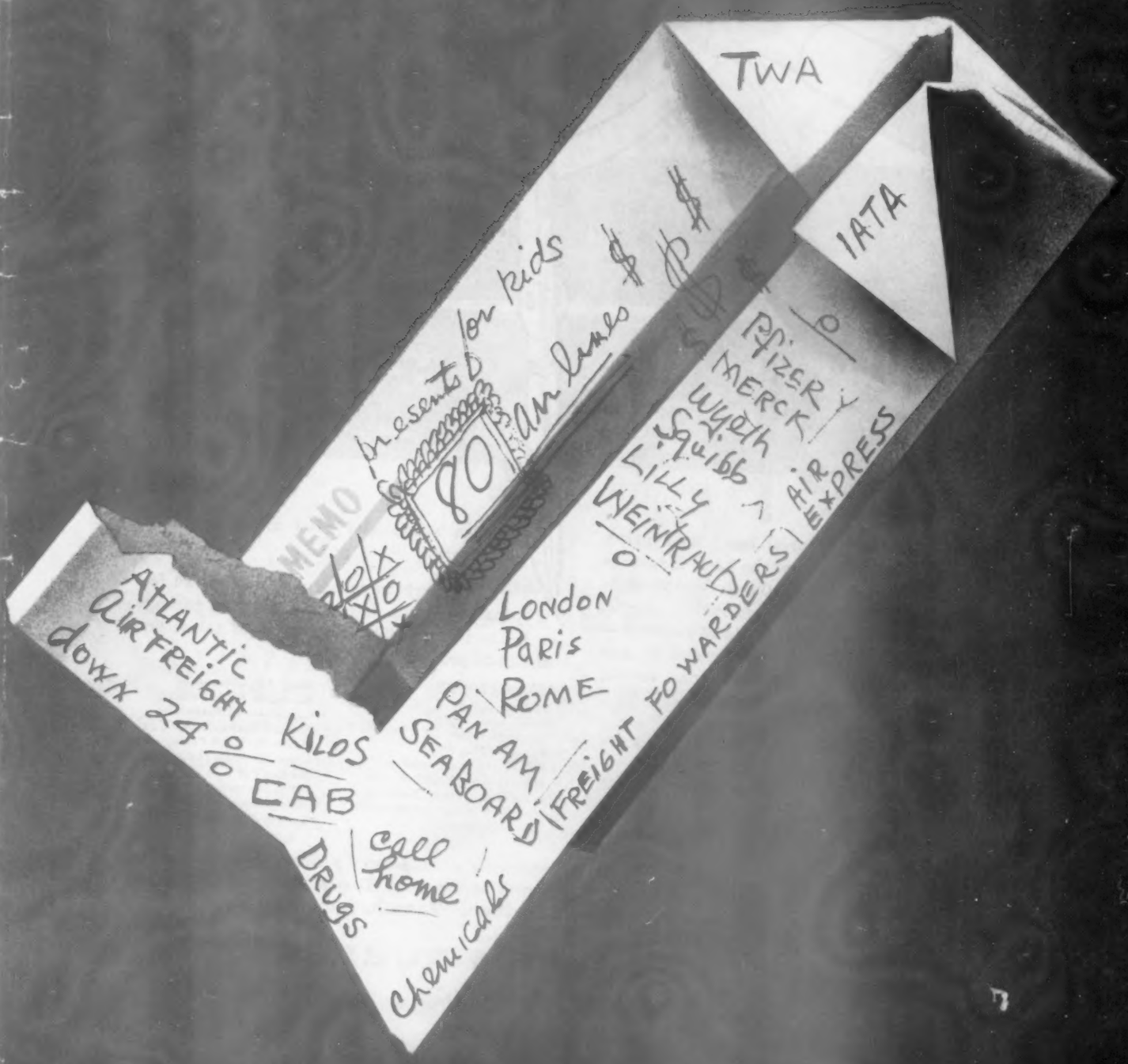

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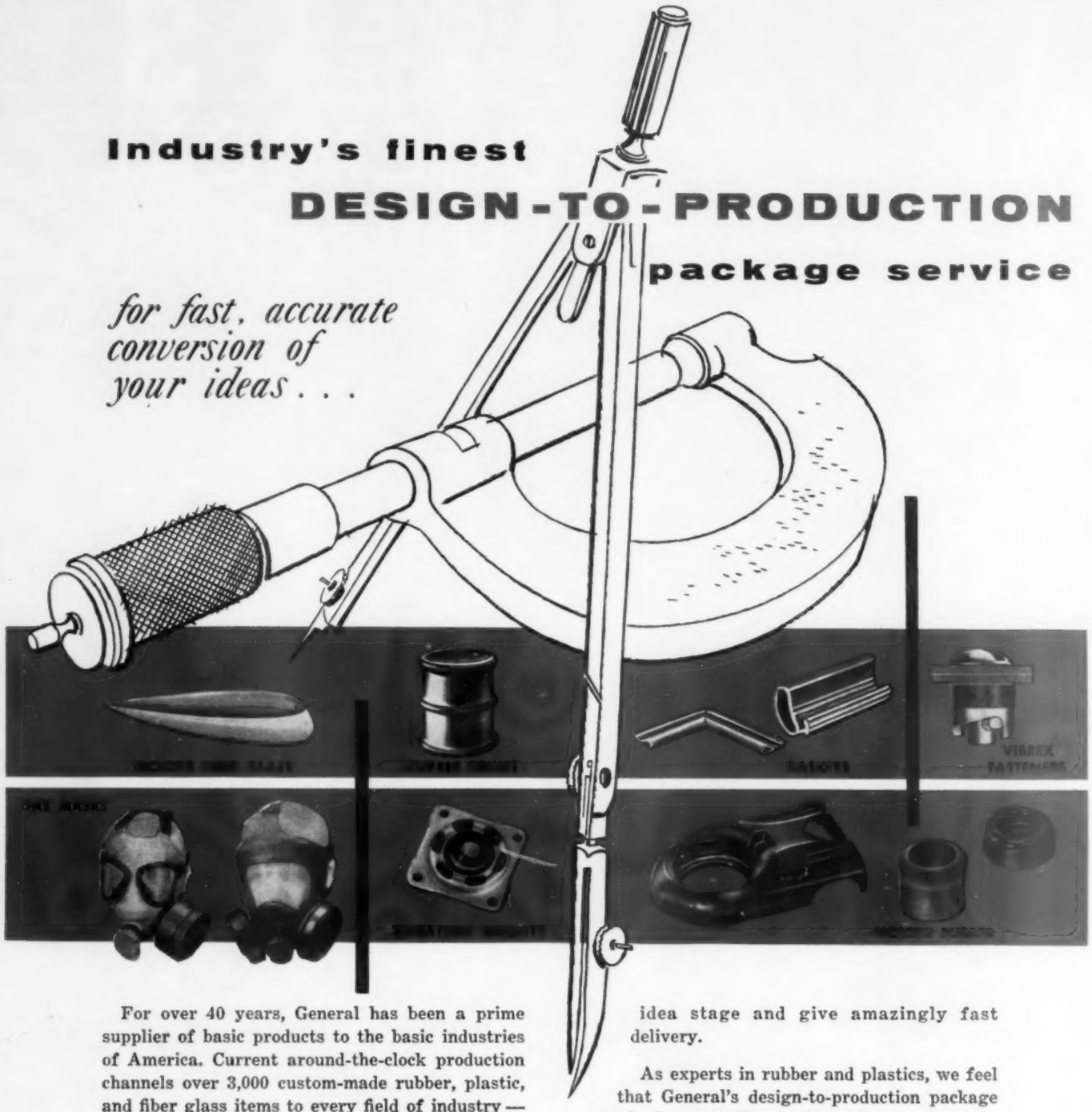

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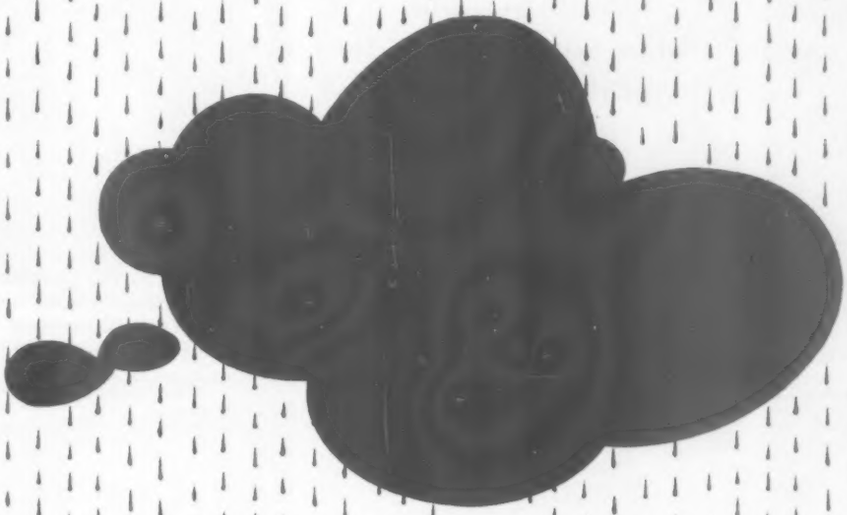

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OFFICIAL PUBLICATION OF THE ARMED FORCES CHEMICAL ASSOCIATION

SUITES 408-410, 2025 EYE STREET, N.W., WASHINGTON 6, D.C.

VOLUME XV | MAY-JUNE, 1961 | NUMBER 3

POLICY

The fact that an article appears in this magazine does not indicate approval of the views expressed in it by any one other than the author. It is our policy to print articles on subjects of interest in order to stimulate thought and promote discussion; this regardless of the fact that some or all of the opinions advanced may be at variance with those held by the Armed Forces Chemical Association, National Officers, and the Editors. It is the responsibility of contributors, including advertisers, to obtain security clearance, as appropriate, of matter submitted for publication. Such clearance does not necessarily indicate indorsement of the material for factual accuracy or opinion by the clearing agency.

FRONT COVER

By CHARLES MENDEZ

Charles Mendez has designed the cover to be symbolic of some of the thoughts crossing the mind of a member at the Atlantic freight conference in Montreal. See story, page 10.

Members will note that with this issue The Journal changes printers. The new printer is Merkle Press Inc., located in Washington, D. C. The nearby location will speed preparation and production of the magazine.

CONTENTS

ADVERTISERS

Published by-monthly—January-February; March-April; May-June; July-August; September-October; November-December; by the Armed Forces Chemical Association, National Headquarters, located at Suite 408, 2025 Eye St., N. W., Washington 6, D. C. Second Class Postage paid at Washington, D. C. Subscription price $3.00 per year to members; $6.00 per year to non-members in the United States, Canada and Mexico; elsewhere $1.00 additional for postage. Printed by Merkle Press Inc., Washington, D. C. Inquiries concerning circulation and advertising should be addressed to the Secretary-treasurer.

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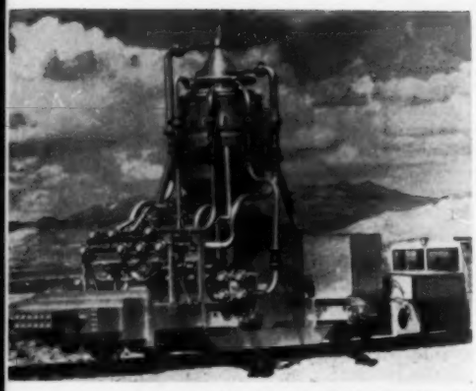
KIWI

THE BIRD THAT DOESN'T FLY



A model of the first experimental nuclear shell in the Nuclear Rocket Propulsion Program at the Nevada Test Site. The non-functioning mock-up of Kiwi-A is pictured.

Kiwi-A in full power operation on July 1, 1959. This picture is enlarged from a frame of a movie camera located some 500 yards from the test cell. The hydrogen exhaust flame extends considerably beyond the luminous control column. Since it is transparent, it can be observed in the photo only by blurring details of the mountains in the background.

ATOMIC power for space travel is beyond early beginnings as a result of the successful operation of Kiwi, the name for a nuclear heat exchanger.

Kiwi, the engine, is mounted on a frame of railroad rolling stock and its exhaust of hydrogen gas is upward into the sky. It is bare of any superstructure for flight or launching purposes, so this motor is earthbound. Somebody with a penchant for nicknames dubbed the engine and its series of tests as Kiwi, after the New Zealand bird who doesn't fly either.

In all three of its models, so far as looks go, Kiwi is reminiscent of a steam engine that firefighting companies hauled with horses around the turn of the century to increase the water pressure, once the volunteers and bully boys got to the blaze. Old lithographs depict these coal or wood burners with horses a-gallop, smoke pouring out of the upright boiler, and everybody rushing to the fire.

VENTURI PRINCIPLE

Kiwi, however, is an engine which obtains thrust by exhausting hydrogen gas. The engine makes use of the venturi principle and passes the gas through a nuclear reaction before it reaches the exhaust ports. The expanding gas leaves through the jets at such high velocities, or thrust, that engineers see this type of propulsion as highly satisfactory for travel in the space band from Venus to Mars. The immediate target is the Moon.

Tests of the Kiwi-A, Kiwi-A-Prime and Kiwi-3 are all parts of the Rover Project, an assignment to discover and develop nuclear rocket propulsion. The work has been carried out by the Los Alamos Scientific Laboratory which is operated for AEC by the University of California.

Although simple in concept, a nuclear rocket engine operating at the temperatures and power densities required for useful space application challenges the best technology available, according to Dr. R. E. Schreiber of the Los Alamos Labs.

SEVEN FIRMS

Seven industrial firms have responded to the invitation to develop this engine with the assistance of the Los Alamos Labs. These studies, tests and preliminary designs of the flight engine will be based on the data collected in the engineering and tests made in the Kiwi-A series.

Actual flight motors will use liquid hydrogen, hydrogen pumps and nozzles cooled by the hydrogen fuel. These basic changes will represent the change-over from test to flight engines.

The seven firms offering to undertake the job are: Aerojet General Corporation; Rocketdyne Division, North American Aviation; American Metals Products Corporation, Ann Arbor, Michigan; Pratt & Whitney Division, United Aircraft; Thiokol Chemical Corporation; Westinghouse; and General Electric. AEC and NASA are studying the proposals made to them as a result of the invitation the government issued for bids from private industry.

SIZE OF AN AUTO

Schreiber described the project in general terms as an engine that must be light in weight but must develop large amounts of power. He foresees a nuclear engine about the size of an automobile that generates enormous amounts of power and operates at the temperature of a blast furnace.

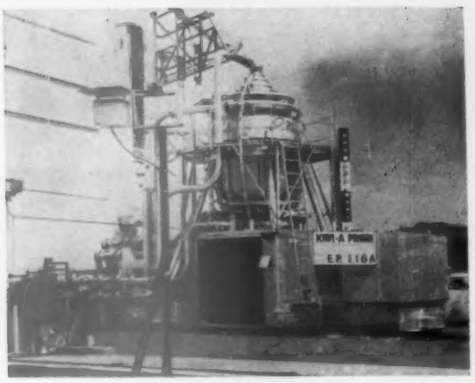
The problem, he states, is eased by the fact that the operating is measured in minutes. But, it must be able to start and stop quickly and many missions may require that it go through several cycles of operation.

The three experiments on the Kiwi-A Series were to develop reactors, design procedures, characteristics of materials, and general performance of the systems.

First of these reactor experiments, named Kiwi-A, was run in July 1959. It was a graphite reactor using flat plate fuel elements. The elements were approximately ¼-inch thick with 0.05-inch wide with a flow passage separating the fueled plates. The second experiment, Kiwi-A-Prime was run in July 1960. It was made with a different core in the reactor. The third test, Kiwi-3 was made in October 1960, with modifications as a result of previous tests.

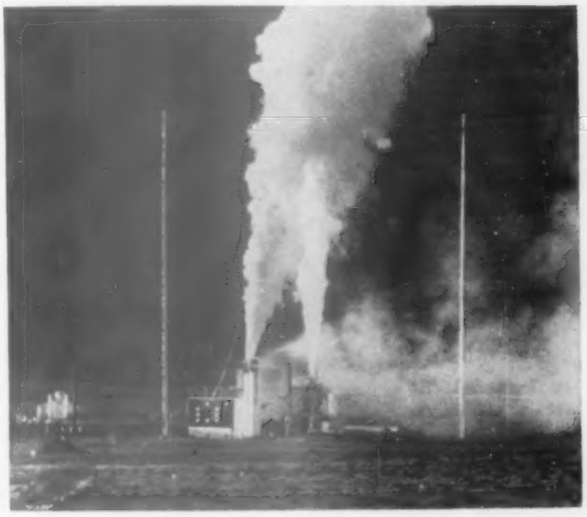
KIWI-B NEXT

The next series of tests, Kiwi-B Series, will use liquid hydrogen as a propellant fuel and liquid hy-



Kiwi-A-Prime, one of a series of atomic reactors for studying the feasibility of nuclear rocket propulsion.

This picture, taken at a distance of two miles, shows Kiwi-A-Prime at its test cell ejecting a stream of hydrogen gas into the atmosphere. The smoke plume arising from the left of the test cell comes from an array of JATO bottles and was used to mark the slightly radioactive colorless hydrogen vapor for cloud tracking purposes.



Man is one step closer to interplanetary space travel following the successful test of Kiwi-A3. The white exhaust coming from the nozzle of the reactor is burning hydrogen gas which is heated to a high temperature by fissioning uranium 235 inside the reactor. The large cloud from the test cell at the left is made by a JATO smoke pot to enable sampling aircraft to follow the hydrogen cloud.

Artist's conception of the Test Area No. 1 at Jackass Flats, which will be used to test the first nuclear rocket propulsion reactor.

drogen instead of water to cool the nozzle and the critical components of the system. Hydrogen turbopumps and nozzles required for the B-series are being developed for AEC-NASA Nuclear Propulsion Office of the Division of Reactor Development, AEC.

The test cell in the Kiwi-A reactor is being modified for liquid hydrogen, and an additional test cell is being built. A down-range reactor test stand is now being designed by Aerojet General Corporation under contract with AEC. NASA has also initiated studies for a master plan to provide a National Nuclear Rocket Development Facility.

Studies are in process by Lockheed, Martin, Douglas and Convair to evaluate various methods of light testing nuclear rocket stages. These four companies are contributing their own funds to this program.

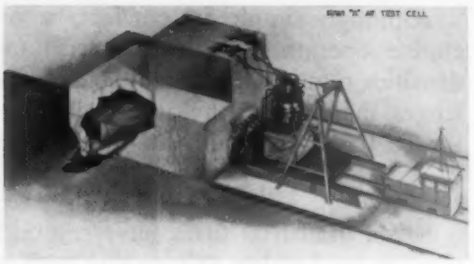
JACKASS FLATS

In the Kiwi-A Series tests at Jackass Flats, Nevada, the reactor was taken to the test cell for firing. There the hydrogen and other elements of the test could be supplied during the run, and the radio-activity of the discharge could be checked. After the test the reactor was uncoupled from the test building and returned to the Maintenance, Assembly and Disassembly Building (nicknamed MAD) for study on results of the run.

Schreiber compares the immediate capabilities of the best chemical propulsion systems with nuclear propulsion as being two to one, or the nuclear system will provide twice the specific impulse. This can be interpreted in various ways, i.e. (1) the nuclear stage would provide twice the velocity of the chemical stage; (2) the nuclear stage would replace two chemical stages; (3) the nuclear stage would perform the task with less propellant.

ESTIMATES ONLY

These estimates are, of course, dependent upon factors of final weight of the reactor, fuel and cryogenic tanks, and shielding, if required. It is certain that we are just beginning to become familiar with nuclear rocket power.



Artist's conception of the first nuclear rocket propulsion reactor which will be static-tested at Jackass Flats, Nevada. The remotely controlled locomotive will take the reactor to the MAD building to be studied.

An all-chemical rocket vehicle required to land a man on the moon and return him to earth in a 10,000 or 15,000 pound capsule would have a thrust at take-off of from 10 to 15 million pounds, according to Harold B. Finger, manager of the Nuclear Propulsion Office. By comparison, he points out, a rocket combining chemical and nuclear stages would need a take-off of from 3.5 to 4 million pounds.

If we consider, Finger says, the 12-foot diameter of the nozzle of our million and one-half pound thrust engine this will indicate the size of a rocket needed to hold 10 of these engines.

The cost of sending a man to the moon has been estimated at $40 billion according to the Associated Press. Or figuring it another way, each American will contribute $220.

ARMY TRAVEL SUSPENDED

Army travel between stations in the United States and between stations in overseas commands for personnel scheduled for transfer during the month of June will be suspended, the Department of Defense recently announced.

The action was taken as an economy measure to permit the Army to stay within its travel fund limitations for Fiscal Year 1961. It will not affect permanent change of station travel to and from overseas stations, particularly for those whose shipment was originally scheduled for May but which was deferred to June. Previously the Army had involuntarily extended overseas tours for personnel in the so-called long term areas from June to July in order to save scarce travel funds.

Military Air Transport Service and Military Sea Transportation Service movements scheduled between the States and overseas stations during June will be continued as planned. Only permanent change of station orders within the United States and within the overseas commands will be affected. Not affected are personnel coming into or leaving the Army during June; patient transfers; Special Forces volunteers; operational re-assignments; personnel assigned to newly-activated units including Overseas Unit Replacement; and programmed unit moves.

Airlines Propose Cuts In Atlantic Freight Rates

Seven Chemicals Drop to 41c per pound • New Lows for Whole Industry

AIR freight rates, for drugs, dyes, insecticides, medicines, pharmaceuticals, paints and varnishes moving over the Atlantic Ocean have been agreed upon by scheduled international airline carriers at 91 cents per kilogram for cargoes with a minimum weight of 45 kilograms.

Figuring the kilogram at its weight of 2.2 pounds, Wade Wynn, traffic manager for Trans World Airlines in the Nation's Capital, states that the new rate is 40.95 cents per pound compared with 55 cents, the rate now in effect for the overseas airlift of these commodities.

This is a flat reduction of 24 percent in cargo rates for the seven chemicals placed in this special classification.

Bulk chemicals, essential oils, cosmetics, toilet preparations and perfumes will all airlift at rates established for general cargo. These general cargo rates are to be paid on the basis of break points in weight, or as weight of the shipment increases the cost per pound is reduced at each break point.

Proposed basic general cargo rates on the New York-London airlift are: under 45 kilograms, $2.20 per kilogram; 45 to 99 kilograms, $1.52; 100 to 249 kilograms, $1.10; 250 to 499 kilograms, 90 cents; 500 to 999 kilograms, 80 cents; over 1,000 kilograms, 72 cents.

These rates are the same both eastbound and westbound.

Bulk Weight Break

A special weightbreak—eastbound only—will have the rate set at 68 cents for shipments of 7,500 kilos and over.

It can be quickly seen from these rate structures, Mr. Wynn points out, that special rate of 91 cents per kilo for the seven chemical products: drugs, dyes, insecticides, medicines, pharmaceuticals, paints and varnishes, would be advantageous to shippers only until 250 kilogram weight is reached for a single cargo, and then the general rate of 90 cents would be more economical.

The agreement on the proposed rates was reached by the airline members of the International Air Transport Association, a trade organization with headquarters in Montreal. Its members include some 80 airlines of American and foreign flag companies, the one non-member exception being the Icelandic Airways. Representatives of the Transatlantic carriers met in series of traffic conferences at Montreal beginning on May 15, to try to agree on an airlift rate scale to replace the expiring rates which end on June 30.

If approved by the interested national governments, the new rates will go into effect on 1 September 1961 and remain during the length of the agreement which ends 31 March 1963, according to IATA press release issued in Montreal by Ralph Cohen.

Extension Approval

The national governments will have to allow an extension of the old rates past June 30 and up until September 1 when the new rates would take effect. The Civil Aeronautics Board is the agency of the United States Government to review and pass on the proposed rate structure, and the extension of the old one as well.

The complete set of rate scales will be on file with the CAB within the next few weeks.

Immediately after the conference broke up in Montreal several members sat down to wade through and prepare the rates scales in final form for presentation to the various governments and industry personnel.

The conference had been in session for a full week and there were also the informal meetings and agreements which led to the final cargo rates. So, probably no one envies the men who have had this task of rate compilation.

IATA made a release which gave the general cargo structure, and left its specific commodity rates to be correlated and tabulated from notes, transcripts and other meeting records.

The specific commodity rates have been reduced to 24 westbound and 15 eastbound categories, as against the approximately 75 classifications in force at present.

Special Effort

Tom Bell of Trans World Airlines, Inc., made the effort to obtain the rate on commodities in the chemical classification so that the figures could be published in the Journal. General cargo rates were published in the daily press immediately after the conference agreed and disbanded.

There may be some "bugs" in the present schedules, but by and large most of the complaints or requests of the chemical shippers seem to be satis-

factorily answered in the rates to be adopted, if the IATA proposals are accepted.

"The airlines are confident that these sizable reductions in air freight rates will break open new markets and magnify the flow of bulk cargo across the Atlantic to match the rapidly increasing capacities of both passenger and jets and all-cargo aircraft," declared H. Bryan Renwick, Chairman of the Conference rate sessions and a Vice President of Canadian Pacific Airlines.

The specific commodity rate system (chemicals of the seven categories are under this) is to help the aggressive development of special markets, according to the IATA.

There are three American flag airlines directly and immediately concerned with the new rate structure: Trans World Airlines, Inc., Seaboard Airlines, and Pan American Airways.

Drug Firms

The American drug firms immediately concerned are: Eli Lilly & Co.; Merck & Co., Inc.; Sharpe and Dome; Wyeth Laboratories; Smith, Kline and French; Sterling-Winthrop Research Institute and Chas. P. Fizer and Co. These firms are reported to be among the larger shippers although the airlines are very tight-lipped about their customers. It is understandable, too, because of the competitive situation.

The story of forces that come into play when Air freight rates across the Atlantic are under discussion is almost as newsworthy as the rates themselves.

Air freight volume, like Topsy, just grew. It went from zero to today's approximate volume of 45 thousand tons across the Atlantic Ocean. Estimate this tonnage at, say, 50 cents per pound and everybody begins to talk about 45 million dollars in total revenues. And, at those prices—even though passengers are the main source of airline revenue—airline owners, stockholders, and shippers are going to find time to talk.

The clash of interests in coming to an agreement on the proposed new rate schedules is due primarily to technological changes in aircraft. Some airlines —notably the American flag carriers—are looking to jet powered cargo carriers and the large bulk shipments that would make these aircraft profitable. To attract business, these airlines desire lower rates which will in turn produce larger and heavier cargoes.

Lowest Charge

Evidence of this desire is expressed in the eastbound (only) weightbreak at 7,500 kilograms where the rate drops to 68 cents per pound, or the lowest offered to the shipper. An aircraft with this load or greater will go eastbound at 68 cents, but return at 72 cents which is the lowest rate traveling westbound.

Some European flag airlines could care less about volume rates as the planes they fly are primarily for passengers or carry small loads of freight. Such airplanes are sometimes termed belly-loaders. The Europeans are vitally interested, however, in certain cargoes like watches from Switzerland, or Volkswagen parts from Germany.

Sending auto parts by air reduces the investment in inventory in the U. S., for example, which is only at a maximum 24 hours from Germany, or the factory. American tractor manufacturers are beginning to use the same idea in sending machine parts overseas.

In addition, it is often cheaper with small cargoes to fly inland into the United States or Europe than to fly only across the water and then finish the delivery by rail or truck. Demurrage, insurance and other charges sometimes make the break in travel more costly than a straight through air delivery.

Freight Forwarders

The rate breaks as outlined in the proposed rate structure offer an opportunity for the freight forwarders to render a service. These companies, Air Express International Corporation, for example,

(Continued on page 29)

Association Completes History of 7th Cavalry

The Seventh United States Cavalry Association has compiled a history of this famous unit under the title of "Of Garryowen In Glory." It was written by Lt. Colonel Melbourne C. Chandler, U.S.A., and covers the activities of this regiment from its founding in 1866 to inactivation in 1957. Heretofore unpublished eye-witness accounts of the Battle of Washita and other battles with the Indians as well as rare maps and photographs are included in the book. The book can be obtained from the 7th U.S. Cavalry Association, P.O. Box 6243, Arlington, Virginia.

Sweden's First Polyethylene Plant Is Announced

Union Carbide Corporation will participate with Superfosfat Fabriks Aktiebolag (Fosfatbolaget) of Stockholm in a joint venture to construct a 35,000,-000 pound per year polyethylene plant in Sweden. Announcement was made early in May by Morse G. Dial, chairman of the board and chief executive officer of Union Carbide. The new plant will be completed in 1962, and will represent the first polyethylene manufacturing plant in Sweden.

Union Carbide is one of the world's leading producers of plastics and chemicals.

New Synthetic Fibers For Military Use

By L. I. WEINER *and* R. C. LAIBLE

Textile, Clothing & Footwear Division
Headquarters Quartermaster Research & Engineering Command, US Army
Natick, Massachusetts

Introduction

TODAY'S synthetic fiber industry has its origin in the pioneering work done in the 1930's by Dr. W. H. Carothers of the E. I. du Pont de Nemours Company. Two fibers which are a direct outgrowth of this early work are nylon and Dacron. However, nearly **all** synthetic fibers known today are developmental descendents of the original fiber polymer types conceived by Carothers.

Technical understanding of the theory of fiber polymerization and spinning has increased to the point where every year hundreds of new fibers are created in the laboratories of the major fiber producers. It is only the most exceptional of these laboratory fibers that ever reaches the stage of even modest commercialization. Despite the many hazards in promoting the development of a synthetic fiber, more than 300 different trade-name synthetic fibers are now being offered to the textile industry on a commercial scale. Analysis of this group reveals, however, that there are only 42 fiber classes which are sufficiently different in mechanical and chemical properties to be considered separately. As shown in Table I, many of these 42 may be conveniently classified into major groupings such as polyamides, polyesters, and acrylics. The great majority, as indicated in the last column, cannot be assigned to a specific generic type.

Table I

TYPES OF MANMADE FIBERS

Generic Types	*Polyamides*	*Polyesters*	*Rayons*	*Acrylics*	*Others*[4]
Broad classes[1] of each type	7	4	7	5	20
Trade-name varieties	36	11	183	18	73
Different physical forms[3] of a single fiber variety available from one manufacturer	150	40	40	15	..

[1] e.g., for polyamides—Nylon 6, 66, 610.
[2] e.g., for Rayon—Courpleta, Arnel, Tricel, Trilan.
[3] e.g., semidull, bright, range of deniers, range of staple lengths.
[4] e.g., polypropylene, polyvinyl alcohol, polyvinylidene chloride.

The existence of so many synthetic fiber types poses a challenge to the designer of military textile fabrics. On the one hand, he has a wide variety of raw materials to choose from, differing appreciably in physical and chemical properties. On the other hand, since these fibers are visco-elastic in behavior, their properties are strongly time- and temperature-dependent. This is of great significance since military fabrics are subjected to strain rates from 10 to 107 percent per minute and to temperatures from —60° C. (or even lower if we consider their use in outer space applications) up to their melting points. Thus, it is not possible to predict performance based upon references in engineering handbooks. As a result, considerable reliance must be placed upon empirical data tempered by experience and judgment.

The possibilities for producing variations in fabric structure are almost infinite. The 42 classes of fibers are each available in a variety of physical forms. As shown in Table I, one type of polyamide fiber can be obtained on the commercial market in 150 different physical forms varying in denier, staple length, crimp, and brightness, as well as in orientation and crystallinity. In design work, these fibers may be used as sole constituents of fabrics or they may be blended with each other or with natural fibers in different proportions as well as in various combinations to produce a broad spectrum of fabric types. An important consideration in designing such fabrics is the fact that minor alteration in the basic design may often produce profound changes in performance properties, particularly in those of military interest. Some of these unusual interactions are discussed below.

Specific Applications for Synthetic Fibers in Military Fabrics

Synthetic fibers are being used in many classes of end items used by the military departments. Items of specific interest to the Army are clothing, tentage, and equipage. Table II lists some of the synthetic fiber fabrics which have shown considerable promise for a wide variety of military applications.

Five of the most recent developments in the field of textile fibers demonstrate both the steady progress being made and its possible impact on the future of textile materials research for military applications: (a) Isotactic fibers, (b) Modacrylic fibers, (c) High-temperature fibers, (d) New bilateral fibers, and (e) Vinal fibers.

Louis I. Weiner

Mr. Weiner received his B.S. in chemistry from Temple University in 1936. As Chief, Textile Engineering Laboratory of the Textile, Clothing and Footwear Division, he is concerned with research on textile materials, and the development of finishing systems and engineered structures of improved functional performance. Mr. Weiner's published works include journal articles, scientific papers, and reports. He is a member of the Fiber Society and the Research Society of America. Mr. Weiner, who is 48 years old, is a native of Philadelphia. He is married and has a son, Stephen, aged 20.

Roy C. Laible

Mr. Laible received his B.S. in chemistry from Northeastern University in 1945, and his M.A. from Boston University in 1948.

Currently a Physical Science Administrator in the Textile, Clothing and Footwear Division, Mr. Laible is working in the field of rheology. Previously, while employed as a chemist in the Textile Functional Finishes Laboratory, he participated in Nevada atomic tests, at which time various treated fabrics were exposed to nuclear radiation.

Mr. Laible is the author of several articles on alkyl polymerization, phosphorus compounds, thermal degradation of cellulose, and others.

TABLE II

SPECIFIC APPLICATIONS FOR SYNTHETIC FIBERS IN MILITARY FABRICS

New Fabric	*Application and Advantages*
Clothing	
Nyco sateen (polyamide/cotton)	Shield fabric for combat clothing Thermal protection Greater wear; lighter weight
Polyethylene/polypropylene spacer	Reduce pack load at pressure points Drape spacing for additional thermal protection
Polyester batting	Insulation at 75% weight reduction
Polyester/rayon twill	Acid & chemical resistance Greater wear; anti-static
Bulked polyamide	Extremely lightweight liner for jackets
Tentage	
Calendered polyester	Lightweight durable fabric for air-supported tentage
High-shrinkage modacrylic	Inherently fire-resistant fabric
Equipage	
Drop cord polyamide fabric	Highly efficient for inflatable pads
High-tenacity vinal	Highly efficient ballistic material
Polypropylene	Web material for load-carrying equipment

a. **Isotactic fibers.**

A fiber development which represents an important advance in fiber technology is the creation of "ordered" or isotactic polypropylene. The system of catalysis which underlies the production of this type of fiber introduces increased precision in the geometry of the polymer chain. Historically, the original work was done by Ziegler, using a catalyst system form $TiCl_x$ and Al $(alkyl)_2$ for polymerizing ethylene. This work was continued and extended by Natta who proposed mechanisms for the reactions and applied suitable catalyst systems to other polymerizations.

The chief fiber produced today using this new system is isotatic polypropylene. This fiber has a much higher melting point than conventional polypropylene and can be readily spun into fibers possessing tenacities comparable to nylon and "work-to-rupture" values greatly in excess of any fiber previously available. This new fiber is being examined for military applications such as ropes, netting, spacers, parachutes, and personnel armor because of its excellent mechanical properties. The raw materials for the production of isotactic polypropylene cost only a fraction of those used in the production of nylon. Thus, there are economic implications which would make it worthwhile to accellerate the application of this new fiber to improved military hardware. Much work remains to be done on ultraviolet stability problems, dyeing techniques and engineering of efficient textile structures. The most interesting aspect of this new system of polymerization is that it may be applied to the production of polymers from materials now available only in the conventional or atactic form. It is possible that such fibers may have tenacities twice those of existing high-strength fiber types.

b. **Modacrylic fibers**

Modacrylics are defined as synthetic fibers in which the fiber-forming system is composed of less than 85 percent but at least 35 percent by weight of acrylonitrile units. Through proper co-polymerization it is possible to introduce specific properties which modify those of the acrylonitrile substrate, many of which are of important military significance. For example, two modacrylic fibers are available which possess inherent mildew resistance and flame resistance. When flame is applied to fabrics made from these fibers, the material shrinks away from the source of ignition without igniting or dripping. Another advantage of this type of fibrous material is that yarns can be made from it which have high shrinkage potential. During the course of manufacture, the fabric is subjected to an elevated temperature to begin the shrinkage mechanism which contracts the fabric, thereby reducing the yarn spacing so that high levels of wind- and water-resistance may be achieved. Prototype tents made from one of the modacrylic fibers (Dynel) have shown very good performance in terms of rot- and flame-resistance, water repellency, and good stability under field exposure conditions.

c. **High-temperature fibers.**

Applications for high-temperature fibers are expanding at rapid rate in all of the military services. The Air Force is engaged in an extensive program to develop a parachute material which will withstand re-entry from space into the atmosphere. The requirements for fabric survival are stated in terms of maximum temperature and time to achieve this maximum. Depending upon specific applications, requirements range from approximately 1300°F for 7 seconds to 550° for 25 seconds. Most attempts to produce fibers which will not change at high temperature have resulted in materials with relatively poor properties at room temperature. For example, fibers made from metals or ceramics have poor flexibility and low "work-to-rupture" and thus are difficult to form into fabrics. An alternative approach is to use certain classes of organic fibers with good properties at ordinary ambient temperatures. These fibers will degrade on exposure to the higher temperatures but at a rate which will enable the fabric to be sufficiently serviceable to complete the mission of the item. A new fiber development, HT-1, retains more than 50 percent of its strength when exposed to over 500°F.

Army applications for high-temperature fibers are mainly for protection against high-energy thermal radiation applied in a short period of time. This problem is of a different order of magnitude from that of re-entry into the atmosphere, and factors such as absorption of energy in decomposition, reradiation, and transmission of the fabric assume great significance. It is important to emphasize that the ability of a fiber to survive very high temperatures for long periods of time will not guarantee its utility in high-temperature applications.

d. **New bilateral fibers.**

Despite the successes with synthetic fibers, man still looks with deep respect on some of the properties of wool. Wool has a high degree of bulk which can be attributed directly to its 3-dimensional crimp structure. It has also been noted by many investigators that the crimp is somewhat reversible; it decreases when the fiber is wet and returns to a high level upon drying. Detailed studies of wool by investigators show that the wool cortex is made up of two parts—ortho and paracortex—and that this bi-lateral structure was responsible for the crimp reversability.

Based upon this knowledge, a synthetic fiber wa

developed with bilateral structure called "Orlon Sayelle." In place of the usual dogbone-shaped conventional Orlon acrylic fiber, this new fiber, has an acorn-shaped cross section. When the cross section is stained, the two segments of the cross section are clearly distinguishable (Fig. 1). One segment of the fiber shrinks more under heat than the other and the result in a 3-dimensional spiral crimp. In practice, this crimp can be developed in the usual processing operations, such as boil-off or dyeing. In water, one side of the fiber swells more and actually elongates, thus decreasing crimp. Drying allows recrimping to occur.

A fiber with these characteristics could give equal warmth with lighter weight clothing and would probably be a good material for wool blends or wool-like blends. A greater significance should be given to the principal involved and its possible impact upon military items. Other synthetic fibers can be developed with bilateral characteristics. These characteristics can be such as to lead to high loft and wool-like properties or perhaps could be picked to give other types of dual "personalities" with increased resistance to static, chemicals, heat, impact, or UV deterioration. The possibilities of extruding two different types of polymers together into one fiber are enormous.

e. **Vinal fibers**

Although polyvinyl alcohol fibers have been produced for some time, Vinal FO (Japanese), can be considered a new fiber. The original polyvinyl alcohol fibers were very soluble in water. Later versions were after-treated with formaldehyde to obtain water resistance; the newest fibers (Vinal FO) owe their water resistance to high orientation and crystallinity. The stress-strain properties of these fibers have recently been investigated by the Quartermaster Corps for possible end use applications. The work-to-rupture was found to remain essentially constant at 40 joules/gram over a wide range of strain rates indicating possibilities for end uses requiring good impact resistance. The ballistic resistance of Vinal has been investigated and is superior to that of nylon, the material now in the supply system.

Textile Fiber Research in the Military Departments

Recent reports from behind the Iron Curtain indicate considerable interest in the production of synthetic fibers. The West is aware of the development of three new fibers with no Western counterparts at this time. In a paper which recently appeared in the Textile Research Journal, it was stated that:

"A possible threat from Soviet textile research lies, not in the development of slightly improved counterparts of nylon, Orlon, etc., but in the possibility of a real breakthrough emanating from extensive work in this field of new and unusual polymers."

To insure a continuing development of military fabrics on a scale comparable to the advances taking place in offensive warfare, it is necessary to have efficient and integrated textile research operations in the military departments. It is obviously necessary to follow and keep abreast of industrial developments in the United States and abroad and to pursue research projects necessary for specific problem areas and from the translation of industrial developments into fibers and fabrics which will have military potential. The research needs of the military services in the field of fibrous and textile materials may be stated as follows:

a. Evaluation of new fibers and fiber modifications to determine avenues for their possible use in military applications.

b. Applied research on the modification of existing fibers and fibrous finishes to provide improved structures and specific properties such as thermal stability and the ability to act positively to destroy chemical and biochemical warfare agents.

c. A positive program to analyze industrial developments in fibers, fabrics, and finishes as soon as they become available even in pilot-plant quantities and to channel research in this field to meet specific military needs.

Aerojet Wins Safety Award

The National Safety Council's Award of Merit went to the Liquid Rocket Plant of Aerojet-General Corporation, at Sacramento, Calif., in recognition of a standout safety record during 1960.

On April 26, Robert B. Young, Aerojet Vice President and Manager of the Liquid Rocket Plant, accepted the Award presented by W. A. (Doc) Huggins, Manager of the Sacramento Safety Council. Representatives of the International Association of Machinists and the Air Force took part in the presentation ceremonies.

USE OF FIBERS BY THE ARMED FORCES

FRANK LOWENSTEIN

Head, Cotton and Other Fibers Section,
Economic and Statistical Analysis Division,
U. S. Department of Agriculture

THE textile industry in the United States is important to labor, to agriculture, and to the general public. Of concern to the industry and the people it serves is the effect of purchases of textiles by the armed forces—in peacetime as well as in wartime. Yet, data with which to judge these purchases were not available until relatively recently.

During the last war, mill consumption of fibers reached a peak of 6,918 million pounds in 1942 compared with an annual average of 4,088 million pounds in the 1935-39 period. The extent to which this increase in consumption went directly to the armed forces is not known. However, the increase was associated with the war effort.

In June 1954, the United States Department of Agriculture began to receive reports from the Department of Defense showing deliveries of textile items to the armed forces. Since then, quarterly figures on these deliveries have been developed and published in **The Cotton Situation** (6 times a year) and in **The Wool Situation** (4 times a year) by the Department of Agriculture. The figures are based on deliveries of items to the armed forces made primarily of fibers. The data do not include fibers used in items made primarily from other materials, such as military hardware.

85% Covered

Reports that are received cover about 85 percent of the deliveries of textiles as defined above. These items are then converted into the pounds of raw fiber needed to manufacture them and the sum is divided by .85 to obtain an estimate of the total fiber used in manufacturing textiles delivered to the armed forces. The fibers covered by these reports are cotton, wool, and manmade fibers.

The amount of fiber used by the armed forces since the second quarter of 1954 has been small relative to the total fiber used by the United States. Although the Department of Agriculture has tried to carry these data back of 1954, we have found that records are not adequate for this purpose.

From 1955 through 1960 the amount of fibers used by the military forces varied from a low of about 36.6 million pounds in 1960 to a high of about 67.2 million pounds in 1957. Even in the peak period, fibers used in textiles delivered to the armed forces accounted for only about 1 percent of all of the fibers used by U. S. mills for all purposes. At the low point in 1960, the percentage was slightly more than one-half of 1 percent. (See table 1.)

Frank Lowenstein is head of the Cotton and Other Fibers Section, Economic and Statistical Analysis Division, Economic Research Service, United States Department of Agriculture. His Section develops the situation and outlook work on fibers and textiles for the Department of Agriculture. The results of this work are published regularly in "The Cotton Situation" and "The Wool Situation."

TABLE 1—Fiber consumption: Textile items delivered to the military forces, United States, 1955-1960

Year	Cotton	Manmade	Wool	Total Military	Total U.S. Mills
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1955	31,909	3,491	8,512	43,912	6,698,700
1956	44,931	5,935	4,896	55,762	6,530,800
1957	50,995	5,519	10,704	67,218	6,221,800
1958	46,655	3,591	10,925	61,171	5,962,200
1959	37,054	2,865	4,398	44,317	6,829,200
1960	29,188	3,193	4,233	36,614	6,498,100

Of the fibers used, cotton has led all the others. For the 6 years under discussion, it has comprised more than 75 percent of all the fibers used in every year except 1955. Wool captured second position in all years except 1956 and the third position was held by manmade fibers as a group. The use of manmade fibers varied from a low of 2.9 million pounds in 1959 to a high of 5.9 million pounds in 1956. The figures for manmade fibers cover all types, including the cellulosic manmade fibers (rayon and acetate) and the noncellulosic manmade fibers (all others).

There does not appear to be a discernible trend in the consumption of manmade fibers by the military forces. In an effort to see if there was any significant difference in trend, the consumption by the military forces was estimated for each of the two types of manmade fibers for the 3 years for which such data are available, 1958 through 1960. There did not appear to be a consistent trend for this short period of time. Consumption of the cellu-

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losic fibers in 1960 was about 75 percent larger than in 1958, but 1959 consumption was smaller than either of the other years. Consumption of the noncellulosic fibers declined in 1959 and again in 1960. (See table 2.)

In contrast, consumption of noncellulosic manmade fibers in the United States as a whole has been increasing in recent years. For example, in 1955 such consumption was about 432 million pounds and in 1960 it was about 761 million pounds. At the same time that consumption of the noncellulosic manmade fibers was increasing, consumption of rayon and acetate declined, falling from about 1,419 million pounds in 1955 to about 1,056 million pounds in 1960.

TABLE 2—Manmade fibers used in textiles delivered to the military forces, United States, 1958 to 1960

Year	Acetate and rayon	Non-cellulosic	Total
	Pounds	Pounds	Pounds
1958	686,166	2,904,864	3,591,030
1959	608,284	2,256,872	2,865,156
1960	1,292,429	1,900,134	3,192,563

The fabric delivered to the armed forces cover a wide range of specifications. Deliveries by calendar year for cotton, manmade fibers, and wool fabrics are shown in tables 3 through 5.

More square yards of cotton fabric than of either fiber or wool fabrics were delivered to the armed forces. Also, cotton fabrics covered the largest variety of constructions. Through the 6 years under discussion 26 constructions of cotton fabrics were delivered in significant quantities as contrasted with 12 constructions of wool fabrics and 18 constructions of manmade fiber fabrics—5 constructions of rayon acetate and 13 constructions of noncellulosic manmade fiber fabrics.

The largest cotton fabric deliveries generally were sateen, oxford, duck and poplin. Sateen, oxford, and poplin are principally used for apparel manufacturing purposes. Duck is used primarily for nonapparel purposes, such as tarpaulins for

TABLE 3—Cotton fabrics: Deliveries to United States military forces, by selected fabrics, 1955 to date[1]

Fabric	1955	1956	1957	1958	1959	1960
	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.
Airplane cloth	.....	.....	363.8	768.3	1,234.5	8.8
Batiste	.....	.....	.....	.....	.....	2.1
Birdseye	.....	.....	.....	15.2	60.3	0
Brattice cloth	.....	.....	.....	159.8	0	0
Bunting	.....	181.9	50.6	483.3	409.4	398.1
Chambray	.....	.....	.....	283.8	302.9	98.2
Cheese cloth	.....	.....	.....	.....	426.5	675.0
Cord cloth	.....	.....	.....	207.7	217.2	470.4
Damask	.....	.....	.....	.....	.....	50.3
Denim	.....	.....	.....	715.4	244.2	88.5
Drill	2,145.2	795.1	1,821.3	3,108.9	0	0
Duck	11,860.1	8,172.8	6,908.2	485.9	5,827.9	4,030.0
Flannel	.....	103.6	51.4	0	60.1	142.8
Gabardine	.....	.....	133.1	370.1	0	513.6
Jean	.....	.....	.....	61.5	0	0
Osnaburg	.....	111.3	1,006.0	1,192.8	1,481.8	1,306.0
Oxford	2,930.2	3,735.8	564.5	5,082.0	2,648.6	2,128.2
Permeable	0	0	0	0	0	0
Poplin	0	2,231.8	3,943.4	4,735.8	3,134.0	0
Print cloth	.....	.....	2,115.7	0	0	0
Sateen	9,282.0	18,463.7	27,493.7	14,694.9	2,366.4	1,115.8
Sheeting	.....	25.6	212.2	424.2	3,435.4	236.9
Silesia	.....	62.0	0	0	0	0
Terry cloth	.....	.....	.....	773.2	564.0	253.3
Twill	5,203.5	5,543.2	3,069.1	9,505.4	5,926.3	3,979.3
Webbing[2]	437.5	1,241.3	1,026.0	134.2	312.1	468.4
TOTAL[3]	31,858.5	40,668.0	48,759.0	43,202.4	28,651.7	15,965.7

[1] Does not include fabrics delivered to the military forces in the form of end products.
[2] Includes webbing with cotton warp and nylon filling.
[3] Totals were made before data were rounded.
Compiled from reports of the Department of Defense.

tents. For rayon and acetate the largest deliveries occurred for rayon twill used in apparel. The largest deliveries for the noncellulosic manmade fiber fabrics generally were for ballistic cloth, duck, oxford, and webbing. For wool the principal fabric deliveries generally were serge, tropical cloth, and gabardine, used principally in apparel.

Fabric deliveries to the military forces do not cover all textile deliveries. Some textiles, such as shorts and undershirts, are delivered as finished products to the military forces. However, a large part of textiles delivered to the military forces are initially in the form of fabric which is later manufactured into finished products with contractors performing the additional processing.

There is one large use of manmade fibers which is not covered by the data discussed in this article—the use of these fibers in tire fabrics. The military forces do not buy tire fabric as such. The cord is contained in tires purchased by the military forces. Data are not available which can be used to estimate the quantity of fiber used in manufacturing tires purchased by the military forces.

In summary, the use of fibers in textiles delivered to the military forces comprised a very small part of total U. S. fiber consumption in recent years. Cotton continues to hold the lion's share of the military textile market and the noncellulosic fibers do not appear to be capturing a significantly larger share of this market.

TABLE 4—Wool fabrics: Deliveries to United States military forces, by selected fabrics, 1955 to date[1]

Fabric	1955	1956	1957	1958	1959	1960
	1,000 sq.yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.
Barathea cloth	.....	16	19	6	0	0
Billiard cloth	.....	.....	.....	45	32	27
Broadcloth	.....	.....	.....	52	6	0
Braid, mohair	.....	.....	28	6	9	0
Bunting	.....	.....	.....	.....	.....	25
Elastique cloth	.....	.....	.....	8	20	0
Gabardine	.....	.....	.....	734	707	51
Melton	.....	.....	.....	.....	.....	46
Wool pile cloth	.....	.....	.....	.....	.....	65
Serge	7,767	3,801	8,874	5,297	738	3,520
Tropical cloth	.....	.....	8	645	1,648	344
TOTAL[2]	7,767	3,817	8,929	6,794	3,161	4,078

[1] Does not include fabrics delivered to the military forces in the form of end products.
[2] Totals were made before rounding.
Compiled from reports of the Department of Defense.

TABLE 5—Manmade fiber fabrics: Deliveries to United States military forces, by selected fabrics, 1955 to date[1]

Fabric	1955	1956	1957	1958	1959	1960
	1,000 sq. yd.	1000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.	1,000 sq. yd.
Acetate and rayon						
Acetate (saponified) rip-stop	0	0	0	0	0	0
Rayon twill	2,079.8	4,872.4	1,798.0	1,352.2	703.0	3,383.4
Rayon satin	.....	.....	.....	26.8	238.5	391.9
Rayon banner cloth	.....	.....	.....	.....	25.7	18.3
Rayon webbing	.....	.....	.....	.....	1.4	0
Noncellulosic						
Ballistic cloth	384.7	308.7	206.1	0	0	89.6
Bedford cord cloth	.....	.....	.....	.....	.....	15.8
Bunting	.....	.....	.....	35.6	175.9	1.7
Curtain cloth	.....	.....	.....	8.3	16.1	0
Duck	157.2	749.8	2,391.3	198.9	234.8	201.3
Fleece, knitted	.....	.....	.....	.....	.....	44.7
Netting	.....	.....	293.6	0	0	0
Oxford	.....	.....	106.2	1,858.3	1,030.3	103.2
Parachute cloth	59.5	28.3	70.7	265.9	590.4	71.9
Pressing cloth	.....	.....	.....	61.3	123.5	50.0
Tropical cloth	.....	.....	.....	.....	12.0	0.7
Twill	.....	.....	2,782.0	321.7	499.0	408.0
Webbing	397.5	480.8	26.8	98.8	44.7	94.7
TOTAL[2]	3,078.6	6,440.0	7,674.6	4,227.7	3,695.3	4,875.3

[1] Does not include fabrics delivered to the military forces in the form of end products.
[2] Totals were made before rounding.
Compiled from reports of the Department of Defense.

A. F. C. A. AFFAIRS

A.F.C.A. CHIEFS SLATE ASKIN FOR PRESIDENT

Wendell F. Jackson, E. I. du Pont de Nemours, and Brig. Gen. Clifford L. Sayre, Food Machinery Corporation are planning to propose Simon Askin, Heyden Newport Chemical Corporation, for the next president of the Armed Forces Chemical Association.

Doctor Jackson is the president until his term expires at the June meeting of the Board of Directors, and General Sayer is the immediate past president.

Both Jackson and Sayer report that Mr. Askin's candidacy is receiving favorable comment and support. Unless Mr. Askin refuses to serve it looks as though he will be elected the next president of the Armed Forces Chemical Association.

Simon Askin is president and chief executive officer of Heyden Newport Chemical Corporation with offices in New York City. His career in the chemical industry covers a period of 18 years. During that time he has been employed by Heyden Chemical Corporation with a rapid increase in his executive responsibilities culminating in his election as president of Hayden in 1952. Following the combination of Heyden Chemical Corporation and Newport Industries Company, he became the president and chief executive officer of the combined company from its beginning in early 1957.

Mr. Askin is also the senior executive and a director of Heyden Newport's active subsidiaries and an officer or director of Heyden Newport's various foreign affiliates in eight foreign countries. He is a director of the new Mexican affiliate, Resinera del Tigre which carries on naval stores operations in Mexico. He is also a director of N. V. Transicol, the Dutch company recently acquired by Heyden Newport. This company manufactures paper size for distribution in Holland and Belgium.

Mr. Askin is a past member of the Board of Governors of Synthetic Organic Chemical Manufacturers Association, one of the industry's two leading trade associations. He recently served as president of the New York Chapter of the Armed Forces Chemical Association and as chairman of the Chemical Corps Industry Advisory Council. He also serves as a director of Mutual Investment Fund, Inc., and he was recently elected a trustee of the Chemists' Club.

A graduate of Lehigh University, Mr. Askin resides at Scarsdale, New York with his wife and two children.

Sim Carpenter, supervisor of the Diamond Alkali plant at the Army Chemical Center, Edgewood, Maryland, demonstrates the making of chlorine for a group of visiting sergeants from Fort Holabird.

Left, Cadet Major Calvard S. Allen, Brigham Young University, discusses his future career in the armed forces after being presented the third consecutive Armed Forces Chemical Association Award after graduation ceremonies at the university. Colonel Louis T. Lazzarini, USA Chemical Corps and Deputy Commander of Dugway Proving Ground, Utah, presented the honors. Cadet Allen was also awarded an 18-month graduate course in Nuclear Engineering presented by a representative of the United States Air Force. Upon graduation he plans to become a career Air Force Officer.

FORT McCLELLAN, Ala.—Omer Lee Burnett, left, is presented the Armed Forces Chemical Association, Ft. McClellan, chapter's certificate for the best chemistry exhibit in the Northeast Alabama Regional Science Fair by Lt. Col. Rhett G. Harris, of the U.S. Army Chemical Corps School. The local chapter also presented awards in the four other areas of competition—biology, physics, mathematics, and general science—at the fair held annually at Jacksonville State College. Omer Lee, a Sylacauga High School student, was also the outstanding exhibitor at the fair and will represent his region at the National Science Fair in Kansas City, Mo. (U.S. Army Photograph.)

ROTC cadets from the Georgia Tech Chapter of the Armed Forces Chemical Association visits the Chemical Corps Training Command and attend the Fort McClellan Chapter meeting on "Arms Control." Left to right: Thomas J. Beaird, William Cooke, Warren Locke, Cecil Miller, president of the McClellan Chapter, and Col. William H. Greene, CO Chemical Corps Training Command.

Chairman And Committees Plan 16th Annual Meeting Of Armed Forces Chemical Association

Carroll W. Hayes

Walter B. Winslow

Marvin Marcus

THE 16th Annual Meeting of the Armed Forces Chemical Association will be held in Washington, D. C., over the three-day period of September 13th, 14th and 15th.

The United States Army is acting as the host military service, and the theme for the meeting is "Balanced Military Power Through Science and Industry."

This year the meeting will be held at the Statler-Hilton Hotel, which is three blocks from the White House. From the hotel, it is two blocks south on 16th to Lafayette Park and one block across the park to White House. A statue of Andrew Jackson, astride a horse, is in the center of park and the street which forms the north boundary is called Jackson Place.

On the first day the only activity, outside of the most important functions of renewing old friendships and transacting other business, will be the registration which will start at four p.m. and last until nine p.m., in the upper lobby of the hotel. The hotel management has reserved rooms for assignment to incoming meeting guests.

Called to Order

The following day, September 14, the registration will continue and the meeting will be called to order at nine-thirty a.m. The meeting will be held in the Presidential Room.

The talk before the coffee break will be an Army presentation on the "Forecast of the Future." Following the break and before lunch, General Stubbs, Honorary President of the Armed Forces Chemical Association, will speak on "A Balanced Arsenal and A Balanced Power."

Following this same format, there will be two subjects discussed in the afternoon session. The first part of the afternoon is set aside for a presentation by the Navy and the final session will be given over to a speaker from the Atomic Energy Commission.

From the hours of five to six that same afternoon, there will be a general meeting of the membership in the South American Room.

At six-thirty, following the membership meeting, the scene of activity will shift back to the Presidential Room for a reception under way for those attending the meeting. The party is sponsored by Chemical and Allied Industries. Douglas Weiford, Stauffer Chemical Company, is the Committee Chairman.

Awards

During this reception the Chemical Corps Safety Plaque and other awards will be made. Among the awards planned, are the presentation of the past president's plaque to Dr. Wendell F. Jackson, and an award of meritorious service for two members of the New York Chapter, who are: Simon Askin and Robert J. Milano.

Friday morning, September 15, will be given over to an Air Force technical briefing team, composed of three colonels, who bring the membership up-to-date on the activities of our air arm.

After lunch, there will be a 'Procurement Seminar on Chemical Research and Development' which will be made by representatives of the armed services.

Friday evening at seven p.m. the banquet begins in the Presidential Room. The menu for this affair is yet to be selected.

There will be a ladies' program for the meeting and it will end with the other members at the banquet when the ladies will attend with their husbands.

Room Assignments

Headquarters for the meeting will be in the Michigan Room, headquarters for the press in the Massachusetts Room, registration in the upper lobby, speakers headquarters in the Continental Room, meeting in the Presidential Room, membership meeting in the South American Room, ladies' hospitality in the California Room, exhibits in the Congressional Room and Foyer No. 2, the banquet and cocktail party will be in the Presidential Room.

Military liaison officers for the meeting are: Colonel E. V. Needles and Lt. Col. John Moran, Army; Lt. Col. D. A. McWhirter, Air Force; Captain R. K. Anderson, Navy; Major Phillip Davis, Marine Corps; and Lt. Cmdr. J. D. Crowley, Coast Guard. George L. Clasheen will act as liaison with the Atomic Energy Commission.

Mr. Carroll W. Hayes, Celanese Corporation, is the General Chairman of the Annual Meeting. He is a Lieutenant Colonel in the Army Reserves and has seen service in the European Theatre during World War II. He is a native of New Jersey and a graduate of the Fordham Law School. He resides in Alexandria, Virginia, and is the Washington manager for his company.

Meeting Chairmen

Mr. Walter G. Winslow, Aerojet General Corporation, is in charge of arrangements, attendance and meeting coordination. He will act as general chairman in the absence of Carroll Hayes. He is a Navy veteran who was sunk with the **USS Houston** in the Sunda Strait during World War II. Besides the Purple Heart he has received the Silver Star, Air Medal and a Presidential United Citation. He is a

C. P. Vincent

David Kelsey

Rear Admiral Hottel

Lt. Col. John Moran

Lt. Col. D. A. McWhirter

Capt. R. K. Anderson

native of New York, a graduate of Columbia University, and handles public affairs in Washington for the General Tire and Rubber Company and Aerojet-General Corporation. Winslow has had stories published in Readers' Digest. Mrs. Winslow is the former Toni Favor of the New York stage. They reside in Bethesda, Maryland.

Mr. Marvin Marcus, The Lummus Company, is the program chairman. He is charged with the selection of topics to be presented at the meeting. He is assisted by the military liaison officers in this task. All speakers and their topics are to be named by 22 June. Mr. Marcus who is native of Pennsylvania first came to Washington on duty with the Corps of Engineers. He is a registered engineer and the world-wide director of Government Relations for The Lummus Company, and special representative for Combustion Engineering, Inc.

Mr. Theodore Jonas is the advertising chairman for meeting and the financial success or failure of the day will be determined by the response to his efforts.

Same Job

Dr. C. P. Vincent, Olin, is the public relations man for the meeting. He had the same assignment for the fifteenth meeting and the chairman must have liked his work because he has the job again. He will make three press releases prior to the meeting, arrange for coverage of the meeting, and he has the job of making the various talks available to the press. Dr. Vincent received his Ph.D. at Cornell after an A.B. at Hiram College in Ohio. He is a chemist and corporation executive who has been with Olin for the past 30 years. He has been in Washington for the past eight years as manager of government services, chemical division.

Mr. David Kelsey, Department of Agriculture, is in charge of exhibits. He is a native of New York who studied chemistry at the University of Rochester and took his Master of Engineering Administration at George Washington University. He served with the Air Force in the Pacific in World War II, is a Lieutenant Colonel in the Chemical Corps Reserve. He is a research chemist and economic poison technologist, Department of Agriculture, where he has been since leaving the service in 1946.

Rear Admiral Martin P. (Spike) Hottel, USN Retired, is with the National Lead Company and is the Mobilization Chairman for the meeting. He has been asked to invite government officials to outline what might happen to industry and the nation in the event of an all-out mobilization effort.

Mr. Douglas Weiford, Stauffer Chemical Company, is in charge of the reception and awards to be made on the afternoon of the first day of the meeting. He has been a member of the Washington Chapter of AFCA since 1948, and has held several offices. He was the Chapter president from 1956-59.

COLLEGES SELECT 39 R.O.T.C. CADETS TO RECEIVE A.F.C.A.'S 1961 AWARDS

Calvard Scott Allen
Jerome, Idaho
Cadet Major, AFROTC
Brigham Young University

Chemical Engineer; three times winner of AFCA Award; Arnold Air Society; regular commission in the USAF upon graduation; accepted by Institute of Technology for 18 months graduate study, specializing in the nuclear field.

Charles Frederick Ashurst
Tallahassee, Alabama
Lieutenant Commander, Naval ROTC
Vanderbilt University

Chemical engineer; secretary of Scabbard and Blade; president Vanderbilt Chapter of the American Institute of Chemical Engineers; Sigma Alpha Epsilon; holds a regular NROTC scholarship; scholastic average 2.17 out of a possible 3.00.

Ernest A. Becking
Bad Axe, Michigan
Cadet Captain ROTC
Michigan State University

Chemistry major; Scabbard and Blade; Intramural Athletics; winner of the Annual Collegiate Award of Alpha Chi Sigma, National Chemical Fraternity; superior student Scholarship, MSU; upper one-tenth of class.

Alfred Edwin Bruns
St. Charles, Missouri
Cadet Lt. Colonel, ROTC
University of Missouri

Chemical engineer; Alpha Chi Sigma, Pi Mu Epsilon, Phi Eta Sigma, Tau Beta Pi, Delta Upsilon; designated Distinguished Military Student, tentative Distinguished Military Graduate; University of Missouri Curators' Scholarship; Texaco Scholarship; top of his class, standing in upper three-quarter per cent of a student body of more Executive Board of the student body.

Richard George Buckles
Ithaca, New York
Midshipman, Naval ROTC
Cornell University

Chemical engineer; Varsity track; Scabbard and Blade, Quill and Dagger; Tau Beta Pi; Alfred P. Sloane National Scholar; president of the Executive Board of the student body.

Armed Forces Chemical Association Recognizes Outstanding Science Students Dedicated to Country and Duty

THE Armed Forces Chemical Association awards in recognition of R.O.T.C. cadets who are outstanding in military or naval endeavor and science as well were presented to 39 men this year.

Only one cadet was selected at each university, college, or technical institution, and these schools of higher learning were located in all sections of the United States.

In addition to devotion to country and duty with Reserve Officers Training Corps as one of three military services, Army, Navy, or Air Force, the award winners were required to excel in chemistry, chemical engineering, mathematics or an allied science.

Recommendations for the awards were made by academic and military authorities at each institution. At some colleges there are R.O.T.C. units of more than one service, but one candidate was selected. A board was convened, in some cases, to make the selection.

The award is a military-type bronze medal accompanied by a scroll, and each winner is given a membership in the Armed Forces Chemical Association.

When possible, the awards were made by Chapter members of the Armed Forces Chemical Association located near the university or college.

It is, indeed, a pleasure for the membership of the A.F.C.A. to see young men with scientific training both ready and able to serve the United States in the line of duty. Laurels, too, in the form of good wishes go to the instructors both military and civilian who have guided these men in college careers.

A thumbnail sketch of each officer and his picture is printed in this issue of the JOURNAL. These sketches have a similarity for each one includes the man's name, his home town, cadet rank, college, university, or technical school, and some of his activities as well as his major study.

Pictures of the cadets are arranged in alphabetical manner, according to the man's last name.

A list of universities, colleges, or technical institutions and the action officers for each of the recommendations is also carried in alphabetical order, according to the name of the school.

Roger Clifford Clapp
State College, Mississippi
Cadet Colonel, AFROTC
Mississippi State University

Mathematics major; president of Blackfriars Drama Society; member of University chorus; Omicron Delta Kappa, Phi Kappa Phi, Alpha Psi Omega, Kappa Sigma, Phi Eta Sigma; designated Distinguished Military Student; Freshman Engineering Scholarship.

Charles Edgar Easley
Auburn, Indiana
Midshipman Lieutenant, Naval ROTC
Purdue University

Chemical engineer; cumulative index of 5.49 out of 6.0 maximum, standing third in class of 83; intramural athletics; Quarterdeck Society; Omega Chi Epsilon, Tau Beta Pi. Will be commissioned upon graduation.

John Francis Fallon
Sacramento, California
Cadet Captain, ROTC
Marquette University

Bachelor of Science, majors in biology and philosophy; above average in science courses; member of the University Ski Club and Rifle Team; upon graduation, to be commissioned in the Chemical Corps.

Gary David Fehsenfeld
St. Louis, Missouri
Cadet First Sergeant, ROTC
Missouri School of Mines and Metallurgy

Chemical Engineer; member of the American Institute of Chemical Engineers; Alpha Chi Sigma-Lambda Chi Alpha; recipient of Freshman and Sophomore Chicago Tribune Awards.

Steven Nevins Goldstein
Brookline, Massachusetts
Midshipman Captain, C.O. Naval ROTC Battalion
Massachusetts Institute of Technology

Master's degree in Physics; member of NROTC rifle team; advertising manager Public Relations Committee of student body; business and sales for MIT Technique; received scholarship for graduate work, from National Science Foundation, has worked as Russian translator of technical publications for Arthur D. Little, Inc.

The list of universities, colleges and technical institutions making the Armed Forces Chemical Association awards to their students.

University, College or Institute	Action Officer
Agricultural and Mechanical College of Texas	Frank S. Vaden, Jr. Colonel, Artillery
Brigham Young University	William T. Gibson Lt. Col., Air Force
Bucknell University	Ernest E. Karlson Captain, TC
Carnegie Institute of Technology	William E. Freeman Colonel, CE
University of Cincinnati	George W. Gregg Colonel, USAF
University of Colorado	T. B. Hughes Assistant to Provost
Columbia University	Henry S. Coleman Director of Admissions
Cornell University	R. B. Bretland Captain, U.S. Navy
University of Delaware	Gerald H. Ragsdale Colonel, Infantry
University of Detroit	William B. White Captain, Infantry
Georgia Institute of Technology	W. L. Carmichael Chairman on Student Grants-in-Aid and Scholarships
Idaho State College	David V. S. Kirkpatrick Colonel, CmlC
Iowa State University	Richard S. Bear Dean of the College Science and Humanities
Knox College	Robert C. Turner Captain, Artillery
Massachusetts Institute of Technology	Irving W. Fineberg Colonel, Corps of Engineers
Marquette University	Leonard F. Griffin Lt. Col., Corps of Engineers
Michigan College of Mining and Technology	Wilson P. Andrews Captain, Corps of Engineers
Michigan State University	Merton E. Munson Colonel, Artillery
University of Missouri	Peter A. Helfert Lt. Col., Artillery
Missouri School of Mines and Metalurgy	James K. Walton Major, Corps of Engineers
Mississippi State University	James E. Sweeney Colonel, U.S. Air Force
University of Nebraska	V. R. Rawie Colonel, Artillery
Notre Dame University	William T. Mullen Colonel, Infantry
North Dakota State University	Joseph W. Mitchell, Jr. Lt. Col. Infantry
North Carolina State College	L. W. Merriam Colonel, Infantry
Ohio University	Willard L. Portteus, Jr. Captain, Infantry
Ohio State University	Ronald B. Thompson Executive Dean
University of Oklahoma	Jodie C. Smith Associate Dean of Students
Purdue University	C. M. Robertson Captain, U.S. Navy
Rensselaer Polytechnic Institute	Clayton F. Gray Major, U.S. Air Force
Rice University	Ernest C. Kobs, Jr. Captain, Corps of Engineers
Rose Polytechnic Institute	F. M. Walker Lt. Col., Corps of Engineers
Saint John's University (Minnesota)	Francis J. O'Connell Lt. Col., Corps of Engineers
Saint Peter's College (New Jersey)	Nelson H. Smith Captain, Armour
South Dakota School of Mines	John W. Chesley, Jr. Colonel, Corps of Engineers
South Dakota State College	Frederick D. Day Colonel, Infantry
Vanderbilt University	Robert S. Rowe Dean of Engineering
Wake Forest College	Lewis D. Prather Major, Infantry
University of Wisconsin	Joseph A. Prall Colonel, Infantry

Richard Francis Humphreys
Lewisburg, Pennsylvania
Cadet Colonel, ROTC
University of Delaware

Chemical engineer; member American Institute of Chemical Engineers; member American Chemical Society; Kappa Alpha Order, Tau Beta Pi, Scabbard and Blade; varsity Golf Team recipient of S. G. Baker Scholarship, Monsanto Chemical Company Scholarship, William Francis Scholarships (2); stands second from top of academic class of 392.

Gerald Irwin Kerley
Hillsdale, New Jersey
Cadet Captain, ROTC
Ohio University

Chemistry; upper quarter in college course; president Newman Club; Dean's Honor List; Phi Eta Sigma, Phi Kappa; commanding officer Pershing Rifles.

Ronald Gene Lewis
Villisca, Iowa
Cadet Major, AFROTC
Iowa State University

Chemical Technology; outstanding student; received Archer - Daniels - Midland Scholarship, awarded through the Chemistry department.

Warren J. Locke, Jr.
Columbus, Mississippi
Cadet Colonel, ROTC
Georgia Institute of Technology

Chemical Engineering; academic standing, 3.6; chapter president, Armed Forces Chemical Association; member American Chemical Society; Briaerean Society; American Institute of Chemical Engineers; Scabbard and Blade; Tau Beta Pi, Phi Eta Sigma, Phi Kappa Phi, Tau Kappa Epsilon.

Charles LaMantia
New York, N. Y.
Midshipman Lieut., J.G., Naval ROTC
Columbia University

Chemical Engineering; stands first in Chemical Engineering, second of 86 students in Engineering School; chapter president of Tau Beta Pi; Engineering Faculty Scholar; U.S. Rubber Foundation Scholar.

John Lewis Martin
Cincinnati, Ohio
Cadet Major, AFROTC
University of Cincinnati

Senior, College of Arts and Sciences; Economics major, Chemistry minor; Dean's honor List, 3.14 average on four point basis; member Arts and Science College Tribunal.

Clark Dale Meek
Gooding, Idaho
Cadet Captain, ROTC
Idaho State College

Mathematics major; Scabbard and Blade, AUSA; Sigma Phi Epsilon.

Richard J. Metzelaar
Hicksville, Long Island, N. Y.
Cadet Platoon Commander, Naval ROTC
Rensselaer Polytechnic Institute

Chemical Engineering; Alpha Sigma Phi; Newman Club; Scholarship Committee.

Kenneth John Meyers
St. Joseph, Michigan
Cadet Sergeant 1st Cl., ROTC
Michigan College of Mining and Technology

Chemical Engineering; stands 65th of 637 in junior class, 4th of 36 in Chemical Engineering Department; the Michigan High School Scholarship, and the John T. Theisen Foundation Scholarship of Theisen-Clemens Co.; Delta Sigma Phi, Blue Key, Phi Lambda Upsilon; secretary of student chapter of American Institute of Chemical Engineers.

Joseph Grant Morse
Novato, California
Cadet Lt. Colonel, ROTC
South Dakota State College

Chemistry major; Scabbard and Blade; American Chemical Society Group (treasurer, executive officer, president); Student Association Board of Control; Dean's list for scholarship; Distinguished Military Student; Phi Kappa Phi Honor Society.

James I. Nance
Detroit, Michigan
Cadet Lt. Colonel, ROTC
University of Detroit

Chemical Engineering; honor student; American Institute of Chemical Engineers; Tau Beta Pi, Tuyere.

George Allen Neece
Pine Bluff, Arkansas
Cadet Captain, ROTC
Rice University

Chemistry major; Dean's list for outstanding achievement; National Merit Scholarship, as freshman; offered research fellowship in Chemistry at Duke University; Alumni secretary Phi Lambda Upsilon; president student chapter American Chemical Society; member of Eulenspiegel; Chevron Club.

Francis David O'Brien
Jersey City, New Jersey
Cadet Major, ROTC
Saint Peter's College

Physics major; Dean's List; Physical Science Society; Amateur Radio Society; Sodality of Our Lady; Order of Cross Keys; AUSA Award; Gold Medal for Academic Excellence; awarded full academic scholarship.

Franklin Talmadge Osborne
Crestwood, Kentucky
Cadet Lt. Colonel, ROTC
Agricultural and Mechanical College of Texas

Chemical Engineering; vice president American Institute of Chemical Engineers; Engineers Council; Phi Eta Sigma, Tau Beta Pi, Phi Lambda Upsilon, Phi Beta Kappa; Monsanto Chemical Scholarship.

Gerald Lew Payne
Columbus, Ohio
Cadet Lt. Commander, Naval ROTC
The Ohio State University

Engineering Physics; Society of American Military Engineers Award; Commandant, Fourth Naval District Annual Award; NROTC scholarship; Anchor and Chain; Scabbard and Blade; Student Senate; Phi Kappa Psi, Sigma Pi Sigma, Tau Beta Pi, Pi Nu Epsilon.

David Edward Quady, Jr.
Madison, Wisc.
Cadet Sergt. 1st Cl., ROTC
University of Wisconsin

Chemical Engineering; 3.5 over-all average, on four point basis; PTA high school award; Freshman Scholarship; Texas Oil Company Scholarship; Phi Eta Sigma Honor Society.

George Alfred Reish
Lewisburg, Pennsylvania
Cadet Lieutenant, ROTC
Bucknell University

Chemical Engineering; American Institute of Chemical Engineers; Engineering Council; Kappa Delta Rho, Alpha Chi Sigma.

Allyn Clair Rieke
Galesburg, Ill.
Cadet Lt. Colonel, ROTC
Knox College

Chemistry; Scabbard and Blade; Knox College General Scholarship; Distinguished Military Student; Reserve Officers Association Medal; Organic Chemistry Lab Instructor; Sigma Nu.

Charles LeRoy Sanderson
Erwin, Tennessee
Cadet Major, ROTC
North Carolina State College of Agriculture and Engineering

Chemical Engineering; American Institute of Chemical Engineers; Engineers' Council; Freshman Track Team; Band and Glee Club; Phi Kappa Tau, Mu Beta Psi, Tau Beta Pi, Phi Kappa Phi.

Philip P. Schlangen
St. Cloud, Minnesota
Cadet Lt. Colonel, ROTC
Saint John's University

Chemistry major; Pershing Rifles; Alpha Kappa Sigma; Toastmaster Club; American Chemical Society; Lab instructor in chemistry.

Robert Lloyd Shaw
Weatherford, Oklahoma
Cadet Colonel, ROTC
University of Oklahoma

Chemical Engineering; 3.31 cumulative average; Intramural athletics; Scabbard and Blade; Sigma Tau, Alpha Chi Sigma; president of his social fraternity.

Mark William Siefken
Fargo, North Dakota
Cadet Lt. Colonel, ROTC
North Dakota State University of Agriculture and Applied Science

Chemical Technology; stands second in class of 15, averaging 3.90 on a four point basis; Minute Man Medal Award; designated Distinguished Military Student; Paint Federation Scholarship; Dow Chemical Scholarship; part-time laboratory assistant National Science Foundation Research Project; president of Chemist's Club; Phi Kappa Phi; member of Executive Committee, Dakota Company, AUSA.

Ronald Eugene Smith
Alamosa, Colorado
Cadet Lt. Commander, Naval ROTC
University of Colorado

Basic Sciences; stands first in NROTC academically, second in aptitude for the service; member Acacia Fraternity, Kappa Delta Pi; Buff Ski Club.

PHOTO UNAVAILABLE

Warren Kester Griffith
Racine, Wisconsin
Cadet Captain, AROTC
Rose Polytechnic Institute

Chemical engineer; explorer-reporter; president S.A.M.E.; treasurer American Institute Chemical Engineers; Lambda Chi Alpha; tuition grant, and Distinguished Cadet Award, in sophomore year.

Kenneth Floyd Tempero
Lincoln, Nebraska
Cadet Major General, ROTC
University of Nebraska

Chemistry; National Commander of Pershing Rifles; president Student Council; teaching assistant, Department of Chemistry; Alpha Phi Omega, Theta Xi, Theta Nu; to receive the General John J. Pershing Medal for 1961.

John Leo Von Wald
Gettysburg, South Dakota
Cadet Lt. Colonel, ROTC
South Dakota School of Mines and Technology

Chemistry major; ranks 18th of 189 students in his class; awarded the Junior Chemical Engineer prize by J.V.N. Dorre Scholarship Foundation; American Institute of Chemical Engineers; Scabbard and Blade; Sigma Tau, Triangle Fraternity.

John E. Wilson
Celina, Ohio
Cadet Captain, ROTC
University of Notre Dame

Chemistry major; Student affiliate American Chemical Society; Knights of Columbus; Fort Wayne Club; National Science Foundation Fellowship to University of Illinois, to work for PHD in Biochemistry.

Sidney Wilson Winslow
Rural Hall, North Carolina
Cadet Captain, ROTC
Wake Forest College

Mathematics major; designated Distinguished Military Student; tentatively accepted into the regular Army with a commission in the Corps of Engineers.

Michael Charles Zerner
Kenberma, Massachusetts
Cadet Major, ROTC
Carnegie Institute of Technology

Chemistry major; Carnegie Tech Honor Award in Chemistry, Lubrizol Award; Procter and Gamble Company Scholarship; Pershing Rifles; Scabbard and Blade; Tau Beta Pi, Phi Kappa Phi, Omicron Delta Kappa, Sigma Xi, Sigma Nu; student member American Chemical Society.

British Army Cooperation

The U. S. Department of Defense and the Ministry of Defense, London, have announced completion of arrangements for use of a British missile firing range by a USAREUR missile unit. This arrangement is in accordance with the principles of interdependence that one NATO country should make available to other NATO countries any spare capacity it has on its ranges.

A CORPORAL missile battalion of the United States Army, Europe, will use the British range in the Hebrides (off the coast of Scotland) during a two-week period in June, 1961. Periodic practice missile firing is a routine training requirement. In lending its range facilities to the American unit, the British Army will extend its cooperation to provide certain equipment and support personnel.

Previously, all U. S. Army missile units in Europe were required to travel to the United States to conduct practice firings.

Air Freight

(Continued from page 11)

operate on the spread or the difference in rates as the tonnage increases. A freight forwarder picking up six individual 40 kilogram shipments would package them at the rate of 90 cents per pound against the cost of $2.20 per pound at the 40 kilo rates. For this spread in price, the freight forwarder would give excellent service to the shipper, stand the costs of putting the cargoes together, and still try for a profit.

This practice of fixing freight rates may seem unusual to many in industry. However, the American flag airlines attend rate-making conferences only with the permission of the Civil Aeronautics Board, and with knowledge that the purpose is to establish a series of freight rates. If attempts were made to establish or fix rates without knowledge and consent of the CAB, the airlines who attempted such a procedure would be thought to be in violation of the anti-trust laws. The Civil Aeronautics Board must approve the rates before they take effect.

Early Beginnings

The custom of fixing freight rates was first begun in the United States back in the 1870's. Contrary to any belief that government regulation was interference with private enterprise, a group of New York businessmen demanded that the government do something about railroad freight rates.

The businessmen who were forcing the issue were members of the New York Board of Trade and their complaint was that the railroads were giving lower freight rates to some merchants in New York City than to other businessmen, thus forcing some concerns into bankruptcy.

These were the early beginnings of the Interstate Commerce Commission.

The Atlantic Ocean air freight rates of today propose to reach the cities of Europe and Great Britain at 91 cents per kilo for drugs, pharmaceuticals, and etc., as follows: Amsterdam, Antwerp, Barcelona, Bremen, Brussels, Cologne, Copenhagen, Geneva, Lisbon, London, Milan, Munich, Paris, and Zurich. The rate to Dublin is 89 cents, Rome 93 cents, Oslo and Stockholm $1.04.

Books

A new guide to bulk storage of specially denatured alcohol and proprietary solvents has just been published by U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation.

Chemical Safety Data Sheet SD-82, listing the properties and essential information for safe handling and use of Toluidine is now available from the Manufacturing Chemists' Association, Inc.

Los Angeles to Free Itself of Smog by 1965

Los Angeles County expects to reduce smog by 1965 to the pre-war level of 1940. This is the conclusion of the Air Pollution Control District made in report summing up 10 years of air measurements and analysis.

The report states that air pollution controls will be on most motor vehicles by 1965, and that air contaminants from some sources have already been reduced below the 1940 level and other impurities from non-moving sources should be reduced within the next few years.

During the past 20 years, gasoline consumption by motor vehicles has more than tripled in Los Angeles County. Smog effects were at their worst in 1955 and 1956, a reduction being noted in 1957 and 1958.

Physics Teachers Attend Atomic Energy Institute

Twenty-two college physics teachers will participate in an eight-week summer institute in nuclear physics and atomic energy presented by Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies. The participants are: Earl G. Albert, Wisconsin State College, River Falls, Wis.; Robert H. Brown, Walla Walla College, Walla Walla, Wash.; Justin L. Glathart, Albion College, Albion, Mich.; Paul R. Gleason, University of Redlands, Redlands, Calif.; Franklin Miller, Kenyon College, Gambier, Ohio; James W. Riggs, La Sierra College, Arlington, Calif.; Budd R. Russell, College of Wooster, Wooster, Ohio. Brother Romard Barthel, St. Edward's University, Austin, Texas; William P. Gilbert, Lawrence College, Appleton, Wis.; Howard C. Long, Dickinson College, Carlisle, Pa.; Myron S. McCay, University of Chattanooga, Chattanooga, Tenn.; Albert E. Smith, Atlantic Union College, South Lancaster, Mass.; Thomas D. Strickler, Berea College, Berea, Ky.; Louis Toller, Alma College, Alma, Mich.; Pei-Hsiu Wei, Upsala College, East Orange, N. J.; Densil M. Cooper, Northwest Missouri State, Maryville, Mo.; Theodore J. Hanwick, Augusburg College, Minneapolis, Minn.; Clark W. McCarty, Ouachita Baptist College, Arkadelphia, Ark.; Eugene A. McGinnis, University of Scranton, Scranton, Pa.; John L. Prather, Beloit College, Beloit, Wis.; Joseph E. Price, Idaho State College, Pocatello, Idaho; William K. Robinson, St. Lawrence University, Canton, N. Y.

Oak Ridge National Laboratory, one of the largest nuclear energy research and development laboratories in the nation, is operated by Union Carbide Corporation for the AEC.

DIRECTORS-AT-LARGE, ARMED 1961

Dr. Harold C. Weber

No. 1, New England Area

Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island

Dr. Harold C. Weber is a professor of chemical engineering at Massachusetts Institute of Technology. He was educated at M.I.T. and received his Doctor of Science degree at the Swiss Federal Institute in Zurich. He served as 2nd Lieut. in the Chemical Warfare Service during WW I. He has written papers on heat transfer, petroleum refining, heavy chemistry, electronic and mechanical devices, and a book on thermodynamics. He has been a consultant on chemical problems in industry and is a member of Sigma Chi and the Chemists' Club, and a ham radio operator.

No. 2, New York Area

New York, New Jersey

Simon Askin

Simon Askin is president of the Heyden Chemical Corporation, and director in American Potash & Chemical, Jamieson Pharmacal Company and other chemical concerns. He is considered by the present officers of the Armed Forces Chemical Association to be one of the leading executives in the chemical industry today, and these officers, notably, Wendell F. Jackson, president, Brigadier General Clifford L. Sayre, immediate past president, and Major General C. E. Loucks, senior vice president, are planning to run Askin as the next president of the Association. Askin's company operates on a world-wide basis and he is familiar with most of the problems in the chemical business whether at home or abroad. (see the biographical sketch on the page with A.F.C.A. affairs)

W. Ward Jackson

W. Ward Jackson is vice president in charge of marketing for Commercial Solvents Corporation. He obtained a degree in chemical engineering at the Newark College of Engineering, and augmented his income in college days by booking dance orchestras or combos into hotels, country clubs and radio stations in and around metropolitan New York in the early thirties. He resides today in Short Hills, N. J., and is a member of the Short Hills Club and Racquet Club there as well as the Union League and Chemists' Club in New York. He has also been active with the Boy Scouts in Short Hills. Jackson holds patents on coated plastic wire screen, and he entered the chemical field with Celanese Plastics Corporation. He served for a dollar-a-year with the War Production Board in Washington, and became Washington Manager for Celanese, after his assignment with the Board. He became sales manager for the Chemical Division of Celanese. After joining Commercial Solvents Corporation as a general manager in the Petrochemicals Division, he became vice president of that division and then took over his present marketing assignment. His direct responsibility is the marketing program of some $70 million per year in five departments: industrial organic chemicals, agricultural chemicals, animal nutrition, automotive specialties, and potable spirits.

Dr. Donald B. Keyes is a consulting chemical engineer in New York City. In addition to teaching chemical engineering at the University of Illinois, he was chief of the chemical branch of the War Production Board during WW II, and worked as a chemical engineer in industry with Bechman & Linden Corporation, U. S. Industrial Chemical Corporation and as Vice President of Heyden Chemical Corporation. He is a native of Westerly, R. I., and was educated at the University of New Hampshire, Columbia University and the University of California. Honorary degrees have been conferred upon him by the University of New Hampshire and Stevens Institute of Technology. He has served on the Board of Directors of American Plastics Corporation, American Potash and Chemical Corporation, and written books on 'Industrial Chemistry' and a 'Chemical Engineering Manual.' He is a trustee of the B. R. Armour Foundation, member of the Engineering Advisory Commission at New York University. He belongs to the Cosmos Club in Washington and the University and Chemists' Clubs in New York.

Dr. Donald B. Keyes

FORCES CHEMICAL ASSOCIATION
1962

Sidney D. Kirkpatrick

Sidney D. Kirkpatrick is the Editorial Director of Chemical Engineering and Chemical Week, and a vice president of McGraw-Hill Publishing Company, Inc. He served with the U. S. Tariff Commission before joining McGraw-Hill. He has written books as well and been an editorial consultant for a 28 volume series of chemical engineering text and reference books. He is a native of Urbana, Ill., and a graduate of the University of Illinois, and has received honorary degrees from Clarkson College of Technology and Brooklyn Polytechnic Institute. He has served as president of the American Institute of Chemical Engineers and is a member of the Society of Chemical Industries. He is a soft spoken man who enjoys people, and, consequently, makes friends with ease.

Selig J. Levitan practices law with offices in New York City. He is a director in Simon & Schuster, Inc., Pocket Books, Inc., Pocket Books of Canada, Ltd., Golden Press, The Levy Foundation (Beth Israel Hospital) and Voigtlander Service Corporation. He is a member of the American Bar Association, New York State Bar Association, New York County Lawyers Association, Associate of the Bar of the City of New York, International Bar Association and American Judicature Society. He belongs to the Harvard Club in both New York City and Boston. Levitan received his A.B. at the College of the City of New York and degree in laws at Harvard. He has been actively engaged in service to his country since 1930 when he became a 2nd Lieut., Infantry Reserve. During W.W. II, he was on duty in the Office of the Chief, Chemical Warfare Service, and is currently a colonel in the reserves. He has been awarded the Army Commendation Ribbon, and the Legion of Merit.

Selig J. Levitan

No. 3, East Central Area

District of Columbia, Delaware, Maryland, Virginia

Brig. Gen. Graydon C. Essman

Brigadier General Graydon C. Essman is the Commanding General of the U. S. Army Chemical Center at Edgewood, Md. He has had as much to do with tactical use of small weapons by the Infantry in our last two wars as any officer now on duty with the Armed Forces. At the time of Pearl Harbor, he was returning from completed maneuvers in North Carolina where the 4.2 mortar had seen some tests. He was later to urge that this weapon equipped with HE shells be assigned to the Divisions ready to attack in Africa, just in case the enemy was planning on the use of gas. These mortars were a success from the start and Division Commanders all through the Army placed this equipment in their own commands. General Essman was born in Independence, Mo., and after two years at the University of Missouri, he entered the Military Academy at West Point. He has attended the General Staff and Command School, the Industrial War College, and done post graduate work at Stanford University. His military duties have taken him through both command and staff assignments, and he served with SEATO and as a military attache. He was wounded at St. Lo, having gone ashore on D-day with the Utah Beach landings.

E. Fogelman is the plant manager at the Diamond Alkali Company leased chlorine plant at Edgewood, Md. He became associated with Diamond Alkali in 1943 when he became a technical supervisor, Diakel Corporation, a government owned facility in Cincinnati. This plant was put on the block and sold after WW II, and Fogelman became chief chemist at Edgewood, Md., where he has remained and advanced with the company through production control supervisor, assistant plant manager, and to his present position as plant manager.

E. Fogelman

DIRECTORS-AT-LARGE, ARMED

William G. Kinsinger

William G. Kinsinger is manager of Hercules Powder Company's Sales Research Division. He is a member of the Commercial Chemical Development Association, Chemical Market Research Association and the American Chemical Society. He resides with him family in Wilmington, Delaware. Kinsinger graduated from Hiram College, Ohio, and received his Ph. D. in organic chemistry at Cornell. He has also attended the Rutgers University Graduate School to study marketing and management. He is a member of Gamma Alpha and past president of the Electron Microscope Society. Before joining Hercules as a research chemist, Kinsinger was with B. F. Goodrich Company.

Dr. William J. Taylor, Jr., has been with the Atlas Powder Company for the past 25 years. He is Director of the Explosives Research Department. A native of Frackville, Pennsylvania, he graduated from Lehigh University in chemical engineering and received a Ph. D. in physical chemistry from New York University. During World War II, he did technical and quality control work at the Ravenna Ordnance Plant, and later the Reynolds Experimental Laboratory, where he first became manager of explosives research.

Dr. William J. Taylor, Jr.

No. 4, Central Area

Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri

Dr. Leland I. Doan

Leland I. Doan is president of The Dow Chemical Company. He was born in North Bend, Nebraska but his family moved to Ann Arbor, Michigan and he attended the public schools there where he later attended the University of Michigan. He holds honorary degrees from Case Institute of Technology, Kalamazoo College, Central Michigan College, Earlham College and Cleary College. He started his business career with the Michigan Bell Telephone Company in Detroit, and joined the Dow Chemical Company in research work. He moved into the engineering department and then transferred to sales. In 1935 he was named a Director and in 1949 he was unanimously elected to presidency of the company. He is a director of the Michigan Bell Telephone Company, the National Bank of Detroit and four Dow subsidiaries. He is a member of Sigma Chi and Tau Beta Pi. His home is Midland, Michigan.

G. M. Glidden is the owner of Acme Protection Equipment Company, located in South Haven, Michigan. He bought the company when it was located in Pittsburgh and after a move to Chicago settled in South Haven. The company manufactures gas masks and protective respiratory equipment. Glidden was born in Paw Paw, Michigan and attended Michigan State University. He graduated with an Electrical Engineering degree in time to join the 160th Field Artillery Brigade and serve with A.E.F. in France during WW I. Back in civilian life, he spent 10 years in the field of public utilities before shifting his activities to safety equipment. He has written articles and is a noted lecturer on the uses of safety equipment, speaking before industrial college audiences. He is a member of South Haven Kiwanis Club, and the Airport Commission. His family includes four children and 12 grandchildren.

G. M. Glidden

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Lewis I. Terry

Lewis I. Terry is Assistant Director of Research for the Dearborn Chemical Company, Chicago. He is a member of the Chicago Chemists' Club and the American Forestry Association. During WW II, he was chief chemist for the control laboratories of the products division at the Army Chemical Center, Edgewood, Maryland. Terry was born on a farm in Durham County, North Carolina, and received his Bachelor of Science degree at Duke University, and a Masters Degree in organic chemistry at Boston University. For ten years he worked in research and development with the Corn Products Company, Agro, Illinois. He joined the Dearborn Company, a firm which specializes in water treatment, rust preventatives, and protective coatings, in 1956. Terry owns the Rapter Laboratories, which manufacture thiophosgene for research in organic synthesis. He is married to the former Phyllis Hattersly of Brookline, Mass., and they have four children. The family resides at Lamont, Illinois. Terry's hobby is a tree farm where he raises pines, reminiscent of the tree growth in his native Durham County.

No. 5, Mid-Central Area

Pennsylvania, Ohio, West Virginia


W. T. Cofer, Jr.

W. T. Cofer, Jr. is the Manager of the Defense Products Department of Mine Safety Appliances Company. He resides in Pittsburgh where the company has its headquarters. Cofer is a member of the Pittsburgh Athletic Association, Churchill Valley Country Club, American Society of Safety Engineers, and the Navy League of the United States. He has received a Certificate of Commendation from the Navy Bureau of Ships for his efforts in development and production work on special respiratory equipment for the Navy. Cofer was born in Bedford County, Virginia and graduated from high school in Roanoke. He attended Roanoke College and the University of West Virginia, and joined a fuel company during summer vacations. He later sold coal for a Bluefield cooperative and came into Mine Safety Appliances Company in the Washington, D. C., office. He represented the company there for seven years, and then moved to Pittsburgh.


Glenn A. Hutt

Glenn A. Hutt is vice president of Ferro Corporation, Cleveland, Ohio. He is a member of American Legion Post No. 54 in Cleveland, Chegrin Valley Country Club, American Ceramic Society, Cleveland Chamber of Commerce, and registered professional engineer. He graduated from Ohio State University with the degree of Bachelor of Ceramic Engineering and joined the Frigidaire Division of General Motors. This was in the early thirties when it was still a problem to manufacture porcelain coatings or interiors for refrigerators or food freezers. Hutt joined the Ferro Corporation in sales and service and then directed their operations in Australia for five years. After serving as general sales manager and assistant to the president he became vice president 10 years ago. He served with the Chemical Warfare Service in World War II, and was discharged with the rank of Captain. His company operates world-wide and supplies basic ingredients of porcelain enamel for coating metal products, and glazes for china, pottery of clayware.


George C. Whitaker

George C. Whitaker is Assistant to the President of The Harshaw Chemical Company. He has been with the Company since he left Miami (Ohio) University where he completed his chemical studies, except during the war years when he worked with the Manhattan Project which developed the atomic bomb. He is active in Cleveland civic affairs, belonging to Cleveland Engineering Society, American Mineralogical Society, Forest Products Research Society, American Chemical Society, and the Cleveland Chamber of Commerce. He has worked in the Harshaw Laboratories, been a plant superintendent of organic operations, assistant plant manager in Cleveland, and member of the company's research staff. On the Manhattan Project, he developed the first continuous fluorine cell along with a process for making chemical fuels. This led to a complete fuel plant for the Manhattan Project.

Directors-at-Large
Armed Forces Chemical Association

No. 6, South Central Area

North Carolina, South Carolina, Tennessee, Alabama, Mississippi, Georgia, Florida, Kentucky, Arkansas, Louisiana

Dr. Frederick Bellinger

Frederick Bellinger is a Professor of Chemical Engineering at Georgia Institute of Technology. He obtained his Master's at Emory University and his Ph. D. at Yale. He was employed by the Hercules Powder Company when WW II started and entered the Chemical Warfare Service as chief of plants design. He later went to Washington on the staff of the Assistant Chief of Materiel CWS, and is now a Lieut. Colonel in the Reserves. He is the director of State Engineering Experimental Station. In 1949 he returned to the War Department as a consultant on status of the German Chemical Industry. He now does consulting work from time to time, and has written papers on absorption, propellants, and food freezing. He has been awarded the Legion of Merit, and resides in Atlanta.

Douglas E. Wilson is the Program Coordinating Officer at the Army Chemical Corps Field Requirements Agency, Fort McClellan, Alabama. He is a member of the Modern Language Association of America, Phi Beta Kappa and Delta Upsilon Fraternity. Wilson is a Lieutenant Colonel in the Chemical Corps Reserve. He was called to service in 1941 and commissioned at the Chemical Warfare School in 1942. He has served as Secretary of the Chemical Warfare School, Edgewood Arsenal, Executive Officer at the Chemical Corps School, Fort McClellan, and with the U. S. Army in Europe. He was born in Washington, D. C., and attended Dartmouth College, majoring in English literature. He received a Masters in English literature and philology at Harvard. He taught English at George Washington, Rice, Harvard and Rutgers Universities.

Douglas E. Wilson

No. 7, Western Area

North Dakota, South Dakota, Nebraska, Wyoming, Colorado, New Mexico, Oklahoma, Texas, Montana

K. C. Clifton

K. C. Clifton is Chief of the Quality Surety Office and Director for Quality Control at the Rocky Mountain Arsenal. He resides in Aurora, Colorado with his wife and two children. He is active there in youth organizations, particularly the Denver Area Council of the Camp Fire Girls. Clifton was born in Moline, Illinois but moved to Denver with his family and attended the South Denver High School and received a chemical engineering degree and a masters degree at the University of Denver. He went with Rocky Mountain Arsenal as a control chemist in 1938, and he then became Chief of the Inspection Office in addition to his present position.

No. 8, Pacific Area

Arizona, California, Idaho, Nevada, Oregon, Utah, Washington

Patrick J. Moran is associated with the Menlo Chemical Company, a firm that specializes in chemical waste disposal and production recovery. The company is located at Menlo Park in the San Francisco area, and Moran also serves as Secretary of the Bay Area Air Pollution Control District. He was an Artillery Officer with the 7th Infantry Division in WW II, and Deputy Chemical Officer of the 6th Army in the Korean Conflict. His present reserve assignment is Assistant Commandant of USAR School at the Presidio.

Patrick J. Moran

The Army Ordnance Missile Command

1.5 Billion Effort • 90% With Industry

By MAJOR GENERAL AUGUST SCHOMBURG

Commanding General

FROM the South Atlantic to the South Pacific, from the Mexican border into the frozen regions of north central Canada, military and civilian personnel of the Army Ordnance Missile Command go about their most important role:

Providing the world's best Army with the best tools to do its job.

Today that mission involves more than 20 missile systems, some scarcely off the drawing board, others well along in the research and development phase, still others in the hands of troops.

It requires an organization with a multiplicity of skills, one that can handle any requirement for any type of missile system. Our spectrum of systems under development ranges from the Redeye, a weapon under development that will enable the individual soldier to carry his own guided missile air defense system into combat on his back, to the Nike Zeus anti-missile missile system, designed to defend the continental United States against the threat of intercontinental ballistic missiles, certainly the greatest technological challenge ever tackled by the Army-industry team. One, may I add, that is being met vigorously.

1.5 Billion

The Army Ordnance Missile Command has a total personnel strength of about 17,600, of whom 3,800 are military and the remainder civilians. Our annual level of effort is approximately 1.5 billion dollars and almost all of it goes into weapons with characteristics tailored to meet the needs of our customer, the modern Army. About 90 percent of our money goes to American industry.

A portion of the program funds comes from other government agencies that make use of the unique capabilities of AOMC. AOMC and its elements perform research and render services for both the advanced Research Projects Agency of the Department of Defense and the National Aeronautics and Space Administration. We act as ARPA's agent in the execution of some other programs.

In addition, AOMC has procurement contracts amounting to $102,302,000 for missiles and missile components for the Air Force, Navy and Marine Corps, National Aeronautics and Space Administration, North Atlantic Treaty Organization, Military Assistance Program, and the Defense Atomic Support Agency.

About half the funds will be spent to buy Sergeant ballistic missiles and Nike Hercules air defense missiles and related equipment for the Military Assistance Program (MAP). Other MAP procurements to be accomplished by AOMC include Lacrosse and Honest John surface-to-surface missiles and related equipment and target missiles.

Marines Purchase Hawk

A $27 million order by the Marine Corps is the largest single purchase by another Service. This order is for the Hawk air defense missile. While the larger portion of this money is for complete missiles and ground equipment, some of it will be expended in further research and development work on the system.

The Marine Corps is also buying complete Honest John missiles and ground support equipment.

The Navy is buying, for its own evaluation, components from the Army's Hawk, Sergeant, Nike Hercules and Honest John missiles. NASA, the Air Force and AEC contractors are purchasing Nike Hercules solid propellant booster motors.

The JCS through the Department of Army has ordered warheads for

Maj. Gen. Schomburg

The Pershing lifts into the night from its mobile transporter-erector-launcher, a major item of tactical ground equipment. The cable mast, falling away to the right, and the TEL are undamaged by the Pershing's blast and are used repeatedly.

the Littlejohn and Honest John missiles.

NATO purchases include the Honest John rocket and ground equipment and the Jupiter IRBM. The Jupiter was designed and developed by the Army but is now under the operational control of the Air Force.

From the twin standpoints of effort and dollars expended, our two major programs are the Nike Zeus and the Pershing. There's a missile with a proud name! Pershing has already established a remarkable firing test record at Cape Canaveral.

Nike Zeus during test firing. Nike Zeus is the only anti-missile missile system currently under actve development by the United States. This test took place at White Sands Missile Range, New Mexico, an element of the Army Ordnance Missile Command.

The prime mover for the Pershing system is this fully-tracked version of the M-113 armored personnel carrier. Four of these vehicles will move the entire Pershing system into unprepared firing sites from which the missile can be fired in a matter of minutes.

Pershing is a selective range ballistic missile using solid fuel.

Missile Philosophy

Pershing, in fact, is a good example of our missile development philosophy: A good weapon in the field, a better one on the way.

There is no such thing, of course, as the perfect missile system, but perfection is what we strive for. We are constantly seeking ways and means of improving performance and reliability of our products. Our development trends are toward more mobile, quicker reacting systems. They must be capable of going where the Army goes and fighting where and when the Army fights.

AOMC is an integral part of the U. S. Army Ordnance Corps. It embraces key installations engaged in the Army's rocket and missile programs from Europe to Kwajalein Island in the South Pacific. North and South it stretches from White Sands Missile Range, New Mexico, to Fort Churchill, Canada.

Resources and capabilities of the Command cover a wide range, from basic research, to proving facilities, to the firing of all types of rockets and missiles.

Headquarters, AOMC, is located at Redstone Arsenal, Alabama, a command element. The Army Ballistic Missile Agency and the Army Rocket and Guided Missile Agency, two of the major operational segments of the Command, are also located at Redstone. A fourth element is White Sands Missile Range, N. M.

AOMC manages about 50 percent of the total Army Research, Development, Test and Evaluation program (RDT&E), or about 4500 million annually. In the Procurement of Equipment and Missiles, Army (PEMA), the Command manages about 35 percent of the total Army program. This also amounts to approximately 4500 million annually.

54,000 Subs

Our main job is technical supervision of our vast contractor structure. We do business with more than 40 prime contractors and some 54,000 subcontractors.

To supervise the contractors' efforts effectively, we must be able to deal technically with contractors on equal terms. We maintain an "in-house" competence by doing a small part of the technical work at Redstone Arsenal.

AOMC employs three methods of dealing with contractors. Of the five major responsibilities in the development and production of a missile system, AOMC always retains the job of technical supervision of contractors' efforts. Similarly, the contractor is always responsible for production manufacturing efforts.

First, as in the Jupiter system, engineering design responsibility is a completely in-house operation. Most of the engineering design effort on Jupiter was done by the Army, while most of the R&D manufacturing effort was the job of the contractor.

In the Nike Hercules program, all responsibilities and efforts other than technical supervision were given to the contractor.

The third type, which is being used with the Pershing, lies between these two approaches. Here all the R&D manufacturing effort and most of the engineering design responsibility and effort were given to the contractor.

Time Is Prime

One of the most striking problems the manager faces in the missile business is the need for developing and fielding his hardware in the shortest possible time. If troops are to have modern weapons, a technique must be employed for shortening the time between concept and deployment. This thinking has led to the telescoping of the phases of the weapon system cycle. By overlapping the production, training, logistical support and deployment phases, we save valuable time in fielding complete systems.

Although AOMC acts as manager, technical supervision is assigned for particular weapons systems to the two sister agencies which are elements of the Command, the Army Ballistic Missile Agency and the Army Rocket and Guided Missile Agency.

ARGMA is under the command of Brig. Gen. John G. Zierdt. His organization is charged with development, procurement, production, industrial engineering, industrial mobilization, maintenance and repair part supply and stock control of missiles that can be maneuvered after firing.

Rockets and Missiles

Present personnel strength of ARGMA is about 3,550, representing 3,200 civilians and 350 military personnel.

Major elements of the Agency include three Divisions — Research and Development, Industrial, and Field Service. A series of laboratories, which are devoted to research, development and testing operations, are established within the confines of the Arsenal. Each division of the Agency works with private contractor firms scattered the length and breadth of the United States.

Systems for which ARGMA is responsible include: Nike Ajax, Nike Hercules, Nike Zeus, Hawk, Mauler, Redeye, Lacrosse, SS-10, SS-11, Shillelagh, and the Field Army Ballistic Missile Defense System.

ARGMA's Nike Zeus program is now extended to the small South Pacific island of Kwajalein. Installation of Nike Zeus system test facilities and equipment is under way there. Zeus missiles will be fired from Kwajalein to intercept Atlas intercontinental ballistic missiles fired from Vandenburg Air Force Base in California, in full scale tests of the Nike Zeus system.

ABMA, commanded by Brig. Gen. Richard M. Hurst, has responsibility for research, development, procurement and field support for surface-to-surface missiles and rockets whose flight is predetermined or pre-programmed, and which are essentially ballistic systems.

Ballistic Missiles

Total strength of the Agency, including military personnel and civilian employees, averages about 2,630. Major divisions of ABMA are Research and Development, Industrial and Field Support.

ABMA is new responsible for the following systems: Redstone, Pershing, Jupiter, Sergeant, Corporal, Honest John, Littlejohn, Missile "A", Missile "B", and the XM-72 light anti-tank weapon. The Air Force has operational control of the Jupiter system.

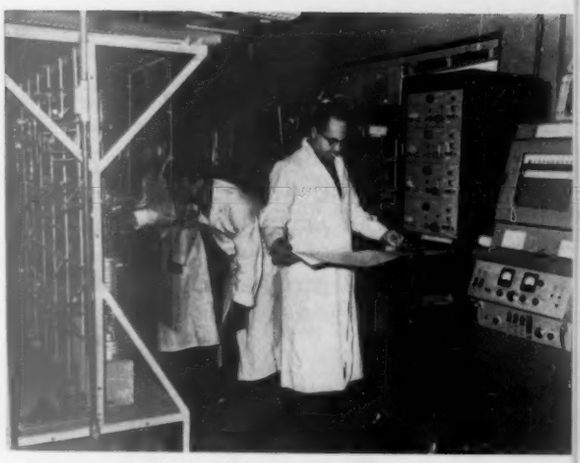
ABMA's major program at present is the development of the Pershing. Named for General of the Armies John J. Pershing, this solid propellant ballistic missile is designed for general support of the field Army. The Pershing test program at Cape Canaveral has been extremely successful. Recently, a major advance was made in the development when the Pershing's inertial guidance system completely controlled the missile during flight.

One of the outstanding features of this system is its mobility. It is completely transportable by tracked vehicles on the ground and by conventional aircraft and helicopter for air movement. The system is compact and simple in operation, allowing almost immediate reaction to a given combat situation. Through use of the tracked prime mover, the system can fire and displace to a new firing position in minimum time.

Tests at White Sands

Our third major element, White Sands Missile Range, the nation's biggest overland missile test range, is commanded by Brig. Gen. John G. Shinkle. Gen Shinkle is responsible for executing all technical and engineering tasks associated with test firings of guided missiles, rockets and other munitions, and for general supervision and coordination of scheduling, range safety, and instrumentation of all test firings.

White Sands currently employs approximately 4,000 civilians and some 2,000 military personnel.



Chemical engineers evaluate results of a new propellant test in laboratory at Redstone Arsenal.

Engineers prepare to fire the SS-10 anti-tank missile on a Redstone Arsenal test range.

Among the varied types of test facilities at Redstone Arsenal is this rocket test ramp, completed in 1955. Rockets to be tested on the ramp are attached to a four-foot-long sled. The sled will attain a speed of Mach 1½ before reaching the end of the ramp. At the end of the rail, the sled falls apart and the rocket is fired, impacting seconds later on a hillside six miles away. The sled is recoverable.

Hawk to NATO

In Paris, AOMC liaison officers are assisting in the supply of Hawk missiles to NATO countries. This is a valuable addition to the defense shield in Western Europe.

Our job is broad and intensive. With more than 20 systems, almost 18,000 persons and an annual budget of 1.5 billion dollars, it represents a large part of our nation's effort to be prepared for any eventuality.

It represents the entire Army effort to provide soldiers with modern, efficient missiles.

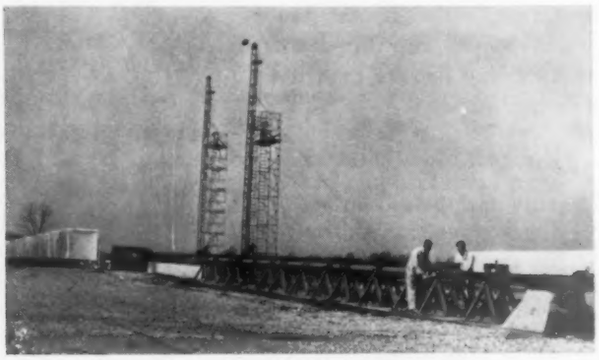
The Army Ordnance Missile Command and its many elements are equal to this gigantic task.

Seminar

A one-week seminar on the management aspects of nuclear shelter planning for business, institutional, and government executives will be held at the **Pennsylvania State University** on August 13-18.

Every phase of nuclear planning will be discussed by experts.

Engineers and technicians prepare a rocket motor for a road test to determine the transportability of the item. The motor will be subjected to greater stresses than it would normally encounter during movement.



Ballistic Gun Tube—A missile model fired through this tube can be examined closely as it passes through the cloth squares at left. Tests such as this provide checks on in-flight actions of missiles. Cameras mounted on the stands in the center record the action.

Admiral Prime Dies
Former AFCA President

Admiral Nathaniel Scudder Prime, who was the sixth president of the Armed Forces Chemical Association, died of cancer in New York City. He was 56 years of age and had been ill for some time.

Admiral Prime has resided at Buckstown, Maryland, since his retirement from the Navy in 1946, and had been to New York where he received hospital treatment. He was the president of Prime, Inc., an engineering firm he had founded several years ago at Buckstown, near Frederick.

The Maryland countryside was a familiar place to Admiral Prime who had served with the Special Projects Division of the then Chemical Warfare Service, and set up the Naval Unit at Camp Detrick. He also had Naval personnel in training at Dugway Proving Grounds, Terre Haute, Indiana, and Horn Island, Mississippi.

He came to his World War II shore duty with the Chemical Warfare Service from action with Admiral Halsey's Third Fleet in the South Pacific. As a Commander, he was the captain of a destroyer and was awarded the Silver Star for gallantry in action.

After his graduation from the Naval Academy in 1926, Admiral Prime became an expert on ammunition and explosives. He had completed the Ordnance Engineering and Explosives course at Naval Post Graduate School, and had received a Master's degree in Chemical Engineering at the University of Michigan.

When the president's gavel was turned over to Admiral Prime in 1954 by Colonel Louis Munchmeyer, the Armed Forces Chemical Association gathering was told that "this was the first time the Association has had a president without Army service."

Admiral Prime took delight and the audience pleasure when he explained that he had served, before entering the Naval Academy, with New York's famous 7th Regiment. It was designated the 107th Infantry when called to federal service in World War I.

Admiral Prime was born in Yonkers, N. Y., and he attended Staunton Military Academy in Virginia. After his retirement, he had been a director of engineering for the Walker Manufacturing Company of Racine, Wis., and president of Langevin Corporation of New York.

Died

Harry A. Bright, former chief of the Analytical Chemistry Section of the National Bureau of Standards, died of a heart attack at his home in Chevy Chase, Maryland. He retired last year after 47 years of government service.

Mr. Bright was a native of Reading, Pennsylvania, and a graduate of Pennsylvania State University with a degree in chemistry. He had written books in the field of inorganic chemistry and was awarded the Department of Commerce Silver Medal Meritorious Service Award.

Dr. Max M. Van Sandt, 57, U.S. Public Health Service, at Walter Reed Hospital. In his present assignment he was the Medical Director for the Atomic Energy Commission and also responsible for radiological health of the *NS Savannah* program. Last year he was given the Pfizer Award of Merit for service to medical health professions. He is survived by his wife Ruth at their home in Washington, D. C.

Thomas E. Murray, former member of the Atomic Energy Commission, died of a heart condition. He was 69 years old.

Mr. Murray, a graduate of the Yale engineering school, held some 200 patents in the electrical and welding fields, and had been knighted twice by the Pope for his work in charity. Murray was probably best known in the daily newspapers for his clashes with Lewis Strauss on how to run the AEC. Strauss was an Eisenhower appointee while Murray was a Democratic holdover assigned to the AEC by the Truman administration. Murray avidly proposed government construction of large power reactors for peacetime uses, but Strauss a firm believer in corporate ownership of power facilities was never to agree with his fellow commissioner.

Mr. Murray was a director in the Chrysler Corporation from 1932 to 1940 and receiver for the Interborough Rapid Transit System, New York City's oldest subway system. He had proposed that the United States fire an H-bomb for an audience diplomats and observers to demonstrate the holocaust of nuclear war. Premier Khrushchev rejected the offer. When Murray's term expired at AEC a group of Congressmen petitioned President Eisenhower for a re-appointment, but no action was taken by the Chief Executive.

Dr. Ralph E. Hall, pioneer in the field of water treatment chemistry and director emeritus of Hagen Chemicals & Controls, Inc., at his home in Rehoboth Beach, Delaware. He was 76 years of age.

In more than 30 years in the field of physical chemistry, Doctor Hall became world famous, receiving 54 patents in the United States, Canada, Great Britain, France, Germany, Japan and Switzerland. A prolific writer, he authored more than 60 technical papers dealing with his findings resulting from his research activities.

Program in Chemical Physics

Polytechnic Institute of Brooklyn has announced an inter-disciplinary degree program in Chemical Physics, on the master's and doctor's levels, to begin with the fall semester. The announcement came from the interdepartmental committee, chaired by Dr. Robert Ullman, professor of chemistry.

According to the group, the need for this program arises because the usual requirements for graduate study in chemistry or in physics are not sufficient for a chemical physicist, and yet much material from both chemistry and physics curricula must be included in educating a chemical physicist. The subject takes in the borderline area between physics and chemistry, but is a "bit closer to the physics side." Among the fields of study chemical physics covers are solid state, X-ray diffraction, Polymer physics, spectroscopy, resonance methods, chemical kinetics and liquid state. Thirteen Polytechnic professors are currently doing research in chemical physics.

Along with the program, the Polytechnic announced three National Defense Graduate Fellowships will be available to applicants for the new curriculum. The fellowships afford the student, in addition to tuition, $2,000 the first year, $2,200 the second year, $2,400 the third, plus $400 for each dependent.

BASES FOR PROTECTION OF INTELLECTUAL PROPERTY OTHER THAN PATENTS, TRADEMARKS AND COPYRIGHTS

By **FREDERIC B. SCHRAM**

PATENTS, registered trademarks and copyrights are familiar examples of intangible personal property which are inclusively designated by the term "intellectual property" or sometimes "industrial property."

All these are represented by official government documents such as a patent certificate or a copyright certificate. Patents are documents granted by the United States government to an inventor on new and original machines, manufactured articles, processes, and compositions and give the patentee the right to exclude others for seventeen years from utilizing the same means of employing a principle to accomplish a result *but* do not protect the abstract idea or principle behind the inventor. Design patents cover only the new and ornamental appearance of manufactured articles. Copyrights are documents granted by the government to an author to prevent others from copying the author's mode of expression (written, oral, dramatic, musical, etc.) for a period of twenty-eight years but leave the ideas expressed free for the world to use. Trademarks are commercial badges or marks applied to commercial products which tell the customer how to recognize other specimens of like goods from the same source.

Other Bases

However, there are also other bases for protection of intellectual property. These include the areas of trade secrets generally, the protection of ideas by agreement, by confidential relationship, and the concept of protection against unfair competition more boardly.

The appended table provides a general comparison of some of the principal forms of statutory and non-stautory intellectual property, but cannot be used as a precise or inclusive exposition of all the details and attributes of such property. These other bases of protection of intellectual property differ from patents, registered trademarks and copyrights, in that they are not evidenced by official documents, but depend upon the common law for protection.

These other types of rights or bases for protection are significant in that they also involve intellectual or industrial, intangible property rights, rights derived from or based upon ideas. It has been said that a microphone can amplify a speaker's voice, but cannot amplify his ideas. Care must be taken to preserve the legal rights in the ideas. There is danger that an idea may die if kept in solitary confinement, also, there is the risk that legal rights will be destroyed if there is prematutre or improper publication. These problems are common to common law rights in ideas and these protected by patents, trademarks and copyrights.

A trade secret has been defined as any formula, pattern, device or compilation of information which is used in business and which gives the owner an opportunity to obtain an advantage over competitors who do not know it or use it. Generally the area of trade secrets includes various types of secrets, many of which may be described as internal business facts, methods of doing business and similar secrets. These include customer lists, secret processes or secret machine structures, also, secret source of supply. Closely related are common law rights to inventions which have not been released to the public domain and common law copyrights or rights in unpublished writings, drawings and the like.

A customer list, built up by an employer over a period of years, is the employer's property and its use

QUICK REFERENCE TABLE OF INTELLECTUAL PROPERTY

Statutory

- Patents (structures, composition, mechanisms and processes)
- Designs Patents (ornamental appearance of manufactured articles)
- Copyrights
  - Writings
  - Drama (written or filmed, spoken or sung
  - Music
  - Works of Art (two or three dimensional)
  - Maps and Drawings
  - Oral Presentations
- Registered Trademarks

Non-Statutory or Common Law

- *Trade secrets (reduced to concrete form)
  - Unpublished inventions
  - Unpublished designs for articles of manufacture
  - Unpublished writings, works of art, etc.
  - Formulae
  - Patterns
  - Compilations of Information (customer lists, sources of supply, etc.)
  - Internal methods of doing business
  - Secret machine structures
- Ideas (abstract or concrete) protected by
  - Express contract
  - Implied contract
  - Confidential relationship
- Right to Prevent Unfair Competition
  - Unfair use or acquisition of trade secrets
  - Trademarks (arbitrary or fanciful, registrable whether or not actually registered)
  - Trademarks (unregistrable, because not satisfying technical rules of statute)
  - Marks which have acquired a secondary meaning to identify source of the goods.
  - Trade Names
  - Simulation of non-functional features of goods
  - Copying goods in such manner public is misled.
  - Defacing owner's trademark

*See also unfair competition.

AUTHOR

Frederic B. Schramm is a Cleveland attorney who is considered by the members of his profession as an expert in patent law and its allied fields. He was kind to write this article for the Journal when requested to so by the American Patent Law Association. He is the senior member of Schramm, Kramer & Sturges.

by a former employee for his own advantage will be enjoined. On the other hand, lists of customers which may be readily acquired by observation or use of directories are not protected.

A process, tool, mechanism or compound may be protected as a trade secret, although it may be unpatentable. A trade secret may even coexist with a patent under certain circumstances notwithstanding the fact that the patent has been fully published and disclosed. For example, patterns which aided in the manufacture of patented pumps were protected as trade secrets, although the patterns were not covered by the patent. Limitations on a patent obtained or even invalidity of a patent have not precluded recovery for the unfair use of an unpatented or unpatentable idea.

A secret source of supply may be protected as a trade secret. The secret may be that the business purchases from a particular supplier or in a particular locality. Needless which have been manufactured and sold were made from the species of cacti which grew in a particular area, and this fact was not known to others. A protectable trade secret may be the character of machines used by a manufacturer or the place where his machines are manufactured. Competitors and former employees are free to use sources of supply which are known to all or which may be ascertained readily by reference to manufacturers' directories, advertisements in trade magazines or the like.

Common Law Protection

Literary property in an intellectual production is afforded protection by the common law. For example, the court has recognized the property right in a synopsis for a photoplay supporting an implied contract to pay for the use thereof, although the synopsis related to unprotectable material such as historical events.

Recovery for violation of trade secrets, according to the circumstances, may be based upon the breach of a contract either expressly made or an implied contract or for breach of a confidential relationship. Many courts have held that an employee is under an implied obligation not to divulge or use confidential information which he acquired by reason of his employment. The relief afforded for violation of a trade secret may include recovery of money damages for past harm, or a court order to prevent future harm by forbidding disclosure or adverse use of a trade secret, or an accounting of the wrong-doer's profit, or to have the physical things embodying the secrets, such as designs or patterns surrendered by the wrong-doer for destruction or return to the rightful owner. Purloined drawings or patterns or the like may be recovered by legal action.

Defenses Available

A person charged with violation of a trade secret has various defenses, however. Where the owner merely charges mis-appropriation of a trade secret without showing violation of an actual contract or unfair competition or unfair tactics, the defendant can avoid liability by showing that the alleged trade secret was known to the recipient prior to its disclosure to him. Nevertheless, such prior knowledge must be proved as certainly as in a patent case where the patent is alleged to be anticipated by prior use. A defendant's contention that he developed the secret independently may be suspect if the nature of his experience is such as to render it unlikely. It is also a good defense if the defendant learned of the secret by analysis or examination of the product. Where the alleged secret was generally known to the trade, this is also a defense for violation of an alleged trade secret. When the only secrets disclosed to the subsequently becomes available to the public, generally, by reason of the owner's publication of these secrets or obtaining a patent disclosing them, they become available to others also. Yet, the issuance of a patent may be no defense to one who has contracted to keep the secret even though the patent claims are found to be invalid or not infringed, or who has obtained the secret prior to the patent grant by unfair means.

Another basis for the protection of intellectual property is the protection of ideas by agreement or confidential relationship. This concept overlaps the matter discussed in connection with the protection of trade secrets, but goes further in that it includes ideas which are not necessarily secrets used in trade. Abstract ideas must be distinguished from concrete expressions of ideas or a means for carrying them out. A written composition represents a mode of expression of ideas upon which copyright protection may be obtained; a written description or drawing may constitute an explanation of means for carrying out a patentable process or means for making a patentable article or machine. However, the protection of ideas by agreement or confidential relationship is not limited to such concrete expressions of ideas.

There may be an express agreement to compensate for use of an idea. It is not the value of the idea nor the benefit of the idea that supports an enforceable contract, but the act of disclosure, the giving up of information which would not have given up except for the contract.

Compensation for Ideas

An agreement to compensate for the use of an idea, or even in some cases for the disclosure of an idea, may be implied from the conduct of the parties or the relationship between the parties. However, where the owner relies on an implied agreement, more is required than in the case of an express agreement.

A property interest in ideas is recognized and protected, but without an agreement the idea must be reduced to concrete form to qualify as subject of protectable property interest and must be novel or have some elements of originality. Moreover, in some cases it has been held that the creator of the idea must not have revealed its content to other persons prior to disclosure to a prospective purchaser. Successive disclosures, even in confidence, progressively diminish the value of the idea to prospective purchasers. However, even when no agreement is involved, the right to protection of an idea may result from a confidential relationship. Such a relationship may arise, for example, when someone with an idea brings it to a tool maker or model maker or manufacturer to be made into something for the exclusive use of the person who disclosed the idea.

Confidential relationships may arise from employment, generally supporting actions for breach of trust in the use of a disclosed idea. The purpose for which a party is

employed may affect the rights to the ideas of either the employer or the employee. One employed to invent would have obligations which would not arise in the case of an employee whose duties were not creative, such as a salesman or an accountant. On the other hand, one who occupies the relationship of trust with respect to the corporation, such as the president of the corporation, may be obligated to assign inventions to the corporation where he has required employees to do so even though the president himself is employed to administer the company rather than to do creative work.

Employee's Obligation

Where the employee is under no contract of secrecy, the courts have held that there is no bar to his use of knowledge and experience gained by him during employment. This is true where the knowledge and experience is that usually acquired in the course of carrying on an ordinary trade. There was a violation of a trade secret, however, in the case of an an apprentice who was being taught the trade of die maker of steel plate, but the information which he carried away from him included a secret arrangement for cutting dies which went beyond the information which die makers ordinarily acquire by experience in the course of ordinary employment.

Mention should also be made of the matter of shop rights to inventions. Mere existence of the relationship of employer and employee does not result in the acquisition by the employer of the rights to all ideas and inventiions of the employee. Quite apart from any contractual obligation or confidential relationship, the employer acquires what is known as a "shop right" in inventions. When an apparatus or a process is developed by the employee in the course of his employment or on the employer's premises, utilizing the employer's equipment, supplies and other facilities, and the employee makes no objection to the use of the invention by the employer, the employer has the right to continue to use it in his business, or to manufacture it. Where the employee expressly asserts that he is retaining all rights to the invention and refuses to relinquish any shop rights, it has been held that the doctrine of shop rights does not apply. Even where there are shop rights, without an agreement, express or implied, the right to the invention does not pass to the employer, but only the right to the use thereof. Shop rights may apply to unpatentable trade secrets, such as methods of doing business as well as to patentable inventions.. An example is changing the routing in order to save in freight charges.

Another approach to the protection of intellectual property, which is not covered by patents or copyrights or trademark registration, is protection against unfair competition. Trade secrets have already been discussed, but usually the basis for protection of trade secrets is that the user of a trade secret is competing unfairly with the owner of the secret. However, the law of unfair competition includes various branches, such as infringement of technical trademarks, infringement of marks which are not good as technical trademarks because not arbitrary or fanciful, but which have acquired a secondary meaning and also unfair competition in the simulation of goods or unjust enrichment by the copying of original goods.

Protected Rights

Rights of this nature are recognized by the courts where the nonfunctional features, or features other than those which lend an article utility, are copied and these nonfunctional features have acquired a secondary meaning identifying the goods with the source. Imitation of goods is an actionable wrong where the source of the goods has come to be identified with the goods. Ordinarily it must be shown that the buyer had been misled. An example of the copying of non-fuctional features, as distinguished from functional features, is copying the peculiar shape of the handle of a wrench where the handle serves only as a handle and is no more practical or convenient to use than the handle of ordinary shape.

Protection has been afforded even when functional features are the only ones which are copied and there is no secondary meaning. The basis for protection in this case is the combination of a number of different functional features. An example is the copying of the minute details of a Smith & Wesson revolver or the copying of pottery ash trays of the very design, identical size, shape and color, but inferior in quality. Even though each feature composing the article may be open to public use, if the ensemble created by the imitator produces an object which misleads the public to the prior user's detriment, there is a right of action for unfair competition.

Protection has been refused against the copying of the pattern in cloth where no copyright or design patent is involved.

Actionable Areas

In some cases an action for unfair competition for simulating the appearance of goods has been upheld on the grounds of secondary meaning, even when a patent thereon has expired. For example, in a case on cutting bits, depicted in the drawings of a patent, it was held that these had acquired a secondary meaning and the defendant was enjoined from making and selling bits having such an appearance, notwithstanding the expiration of the patent or the fact that the bits were an element in a combination, the claims to which were held not infringed by the defendant.

Where confusion from simulation of goods results in diversion of trade, the unfair competition is aggravated rather than minimized by elimination of the owner's trademark or substitution of the infringer's name for that of the original owner.

Conclusion

Where there is any possibility that intangible property or products of the mind may be involved, one must remain alert to the possibility of protecting one's ideas by seeing that they are brought into the proper form for protection, whether by statutory procedures or relying upon the common law. One must weigh the relative advantages of patents, copyrights and registered trademarks, where appropriate, and reliance upon trade secrets, common law proprietary rights and the law of unfair competition. One must recognize the nature of one's rights and see that they are perfected in order that one may successfully assert these rights against others and defend against the claims of others.

An Individual Comments On Guerrilla Warfare

MEMORANDUM FOR: DIRECTORS, OFFICE AND DIVISION CHIEFS
OFFICE CHIEF OF RESEARCH & DEVELOPMENT

SUBJECT: Guerilla Warfare.

1. The expanded interest in Special Warfare activities, particularly guerrilla warfare and counter-guerrilla warfare, is causing this matter to be given a great deal of thought. It is important, in the Office of the Chief of Research and Development, that no effort be left unturned to provide the very latest and most effective equipment for such personnel. This applies particularly to the fields of fire power, communications, and items needed to live within the environments expected.

2. In stimulating thought toward that end I am having a review made in conjunction with the General Staff and Technical Services of what more can be done in this field. To assist in the thinking involved I am attaching comments from an individual who has given much thought to the field of guerrilla warfare. While this has no official standing as doctrine it is thought-provoking and is, therefore, furnished for your study and consideration.

Arthur G. Trudeau

ARTHUR G. TRUDEAU
Lieutenant General, GS
Chief of Research and Development

1 Incl.
Some Comments on
Guerrilla Warfare

I AM flattered that you asked my views on guerrilla warfare and training requirements. I have given a lot of thought to this, particularly as it relates to Communist tactics in the cold war and what we should be doing in this field. Of course my views are personal and probably would not stand the test of the cumbersome staffing and coordination process.

I do believe that accenting guerrilla training in regularly established combat units is not enough. Our regular units should receive training in anti-guerrilla operations because this requirement may be layed on them at any time. The United States has not been faced with fighting against Communist-supported guerrillas to any great extent as yet. But the French, British, and other NATO powers, have had some experience fighting guerrillas in under-developed areas. There are five general areas where we need to take further action.

1. Anti-guerrilla training in its broadest aspects for our conventional forces.
2. Anti-guerrilla training for friendly foreign armies in under-developed areas.
3. Developing a guerrilla warfare capability in friendly foreign armies, particularly where they border on countries with hostile governments with similar ethnic minorities.
4. Developing a guerrilla warfare capability under U. S. sponsorship from refugees from refugees from Communist-dominated countries, including not only those from the communist bloc, but also from such areas as Cuba.
5. A regional school system in Southeast Asia, Latin America, Middle East Africa and also in the United States on Communist strategy and tactics, Free World political goals, guerrilla and anti-guerrilla operations, propaganda and subversion for both foreign and U. S. cadres.

Our special forces came about initially to provide training, equipment and leadership to guerrilla forces in general war. This type of guerrilla warfare was to be primarily for supporting ground operations in general war. Much of our doctrine was patterned after the Soviet use of partisan forces against the Germans in World War II. Even as late as 1956 this was the extent of our doctrine in guerrilla warfare. There was little impetus to change this concept or at least to broaden it. Colonel Ed Lansdale (ASD/OSO) was interested in seeing special forces used to advise foreign armies in under-developed areas how to fight communist-supported guerillas. Unfortunately, ou doctrine is politically sterile and does not provide the answer to all the multiple facets of Communist cold war tactics in under-developed areas. The U. S. still maintains a wall of separation between politics and the military. This is fine for our domestic problems, but it does not work against Communist-supported guerrillas where political and military action are one.

The best example of a foreign army defeating communist-supported guerrillas in their homeland was the Philippine experience in the early 50's. Colonel Lansdale (AF) had

witnessed this action. At first the Philippine Army was unable to isolate and defeat the communist-supported HUKS. I believe the principal reason was that the army forces concentrated solely on trying to find and defeat the guerrillas themselves, ignoring the political climate in the Philippine villages. When the Philippine Army modified its working doctrine and undertook civic action programs designed to win over the villagers, the attitude of the people changed. The people supported the government forces, accepted them as their protectors and withdrew their support (even though sometimes this support was coerced) from the HUKS. With these changes the HUKS were defeated because the fish no longer had water in which to swim. The same tactics were applied late in Indo-China, but too late to save North Viet Nam from Communist control under the Geneva Agreements.

French Army

Some officers in the French Army picked up these tactics in Indo-China and made further studies of overall Communist tactics. It had been quite puzzling for professional officers to witness the defeat of a well-equipped, well-trained, superior professional army by a few poorly-equipped, politically motivated guerrillas. I imagine Batista felt the same way observing a motley crew of Castro followers defeat 40,000 troops equipped with reasonably modern arms.

The French officers attempted to find a solution in a new doctrine for their conventional forces. Their magazine, "Revue Militaire D'Information," in 1957 had several articles reflecting some new thoughts in this field. They called this doctrine revolutionary warfare and psychological pacification. Application was begun in Algeria but was ceased after the French government considered certain French military elements to be using this doctrine against the French civil authorities in Algeria.

I wanted to cover these points to indicate that foreign armies have moved further in anti-guerrilla warfare than we have. We have not had the combat experience in this field. Our experience with the Indians left much to be desired. We did not convert them until they were defeated. The Spanish did better. They converted the natives first. Secondly, there was not a powerful Communist movement to give the Indians their aid and assistance and a political goal. This is the unfortunate difference between the last century and this one.

In the United States there are only a handful of professional officers who have really studied this problem. In foreign countries there is a better reservoir of information. I believe, therefore, that the doctrine for countering Communist guerrilla warfare should first be developed on a regional basis. Here I'd recommend we use SEATO, the Rio Pact and NATO as a basis. NATO primarily for Middle-East Africa.

First, I believe we should support setting up a school or several departments in a regional school, if one already exists, for guerrilla warfare and anti-guerrilla warfare. The Philippine, French, British, Belgian and South East Asian experiences would provide the best initial basis for doctrine and teaching.

The C&GSC is presently developing a doctrine for anti-subversion activities which includes anti-guerrilla warfare. As yet I have not seen the draft.

Well-Trained

I do believe, however, that in fighting guerrillas in former colonial areas it is far better to use a well-trained and indoctrinated indigenous force than U. S., British, or French white forces. A well-trained, indigenous force can better counter the Communist propaganda than the larger powers. At least, our hand will not be as apparent. Our biggest assistance can come through the MAAG's if they are provided with the doctrine for anti-guerrilla anti-subversion, and are given clear political goals.

I believe the school is the first step because the problem should be studied on a regional basis. Experiences have to be collated before a realistic doctrine can be developed. There are already regional schools, as you know, in Panama and the Philippines, where this new responsibility could be placed. One could be formed in the NATO area, perhaps Paris, where we could benefit from the French experience.

We have the basis for assembling such a course in the United States. In addition to training our forces in the techniques of isolating and defeating a particular guerrilla force we must give training in Communist strategy and tactics, American political theory and history, regional cultures, history, and political goals, counter-subversion, public information, troop information, civic action programs, troop community relations, propaganda, terrorist activities, and guerrilla warfare. The schools exist in the CIC School, Information School, Special Welfare School, Civil Affairs School, the '59 National Strategy Seminar. Each could contribute something in the field of their primary interest in how to counter Communist tactics (including guerrilla warfare) in underdeveloped areas. From such a course we could train cadres for military units, develop doctrine, and finally train foreign military leaders from Latin America, Middle East Africa, and Asia.

Guerrilla War Necessary

To turn the guerrilla warfare coin over, we must find a way to overthrow a Communist regime in power short of general war and even short of limited war. I still see no reason why we should accept a tyrant government in Laos, Belgian Congo, or any Latin American country. If they can afford a million dollars a year on propaganda alone in Latin American, and support a Communist government in our back yard, we can support free governments in Eastern Europe or any other area dominated by Communists. Again, this can be indigenous operation supported by the tremendous psychological prestige of the backing of the United States in Eastern Europe. We can provide military assistance to an anti-Communist revolution. But here, too, we need a doctrine in the Army.

Presently we broadcast to the people of Eastern Europe and the Soviet Union as you know. When a revolt occurs such as in Hungary, we are unprepared to cope with it. We could train and equip some of the hundreds of thousands of the nationals who have escaped from Communist domination. I include here not only the Soviet bloc, but Communist Cuba also. Place these

forces under U. S. leadership, organized on the basis of special forces. These detachments could have a capability of becoming a MAAG to a denied area where a resistance potential exists. Where U. S. policy supports such assistance, our whole foreign information activities can be stepped up. The assistance detachments under the Army's sponsorship can provide the basis for not only military assistance, but economical assistance to the resistance forces. There would undoubtedly be a political opposition to the Communist regime which our government might support. A government in exile or in belligerent status would provide the political base for the military or guerrilla warfare operation. I believe Communist armies are susceptible to subversion; however, we're not capitalizing on this vulnerability. The soldiers come from the people and the people of Eastern Europe would fight along with the soldiers to overthrow the Communist regime if they knew we would assist them. The people of Eastern Europe would respect the United States as much, or more, than any other peoples because we are their only hope for the future. The Hungarian Army joined the Freedom Fighters, not the Communist regime. We need no better lesson for all the doubters. The Soviets apparently do not fear that they will start general war when they assist Communist rebels in Laos. Why should we fear general war in providing assistance to Freedom Fighters in Eastern Europe? The people are on our side here. We could do this overtly. But in any event the Army could provide the tactics, doctrine and units to accomplish such an operation should policy ever provide for assistance to the oppressed peoples of Eastern Europe.

I would visualize the doctrine as not much different from present doctrine for special forces. Infiltrate into resistance areas; develop a military base through recruiting, training and equipment and eventually expand the operation to military action if necessary to overthrow the regime. The difference between this doctrine and present doctrine would be these. The operation would not be in support of conventional U. S. military operations. Our military force would be the psychological club held cocked, prepared to prevent outside intervention. The guerrilla war would be political and anti-Communist, for national self-determination. The resistance area would be a base for total U. S. assistance (military, economic, political, psychological). Then let us compromise for a neutralist government in the Communist bloc as the Soviets so well like to do in western colonial areas.

Again, the Army could develop such a doctrine and such units as we have for the nuclear weapons. Where and when we use either is a matter of national policy decision. But the Army should have both weapons in the arsenal.

The Army could also participate in exploiting the vulnerability of the Communist armies as a threat to Communist political controls. Broadcasts for a short time each week could be prepared at Fort Bragg for dissemination over the Voice of America, Radio Free Europe, and Raido Liberation. The Army has the potential. We need more professional talent at Fort Bragg. I believe the largest paradox in the Communist system is their Army. They can't survive without one. But when one exists it is a power force and potential threat to the regime. Two examples stand out. Stalin brutally purged the majority of his senior commanders in 1936. The sore still lingers, I'm sure. The Soviet forces in Hungary fraternized with the Freedom Fighters in 1956. Outside forces, ignorant of the issue, had to be called in.

I certainly do believe we can do a great deal more in this field. I'm not sure the Army staff is ready to go as far as I think we should. The two names I would mention in the Pentagon who are most knowledgeable in this field are Colonel Ed Lansdale, OSO, and Slavko N. Bjelajac, Special Welfare.

MEDICAL MEN TEST ORAL POLIO VACCINE IN PENNSYLVANIA

Swallow two drops of liquid, both are tasteless. A dropper puts the dose in the mouths of babies, children get a sugared mix on a spoon-stick, and adults drink theirs with a half-ounce of water.

This is how the Dauphin County Medical Society is administering oral polio vaccine to some 150,000 Pennsylvanians in and around Harrisburg in both Dauphin and Cumberland counties, Pennsylvania.

Chas. Pfizer & Co., Inc. is furnishing the vaccine for free.

The Medical Society with a membership of 322 physicians plans to give oral vaccine for three different strains of polio virus at three intervals of five to six weeks. The first dose was administered in April and the other two will be given in May and June.

Fourteen immunization points were located in the metropolitan area and both the Harrisburg and Polyclinic hospitals took part. The people came, lined up and took their medicine. Oral vaccine was also offered to those who had had previous polio shots.

The fight against polio has been a tedious one and the discovery of a vaccine brought a prayer of thanks from many parents. However, the Public Health Service figures show that over 81 million persons under 40 years of age never received the quota of four shots, and nearly 20 million persons never received even their first shot.

It is hoped that oral vaccine will lead to a wider use of polio preventatives. This is an added phase of the report that the Dauphin County Medical Society will make on its study of oral vaccines.

WITH THE CHEMICAL CORPS

Mrs. Betty C. Eastman receives a Sustained Superior Performance Award at Pine Bluff Arsenal.

Nellie M. Briel, Administration Division, being presented a Sustained Superior Performance Award by Colonel Melvin W. Reed, Executive Officer, OCCmlO, in ceremony held at Gravelly Point, Va.

A STAR IS ADDED to the six stripes of sgt./Maj. Lynn W. Johnson (L.), an inspector for the Chemical Corps inspector general at Army Chemical Center, Md., elevating him to the "super grade" of E9. Lt. Col. Joseph S. Brinkley, Jr., deputy inspector general, holds the sergeant's new chevrons in place. (U.S. Army Photo.)

MILITARY ASSIGNMENTS

May, 1961

Colonel

W. T. Dozier.....Ft. McClellan, Ala.

Lt. Colonel

W. G. MacFarlane.....CmlC Fld. Reqt. Agy., Ala.

Majors

E. Gershater.....Taiwan
T. A. Mitchell.....Army Cml Ctr., Md.

Captains

J. F. Close.....USAREUR
S. W. Hodges.....Ft. McClellan, Ala.
J. A. Ratliff.....USAREUR

Lieutenants

R. A. Champagne.....USAREUR
S. J. Denmark, Jr.....Atlanta Gen. Depot
D. H. Fraser.....USAREUR
R. Pierre, Jr.....Ft. Bragg, N.C.

June, 1961

Colonel

J. E. Babcock.....Rocky Mtn. Ars., Colo.

Lt. Colonels

P. R. Cerrar.....Dugway, Utah
M. C. Chester.....Fla. State University
R. W. Cornell.....Ft. McClellan, Ala.
C. Dombrowski.....Ft. McClellan, Ala.
J. F. Lane.....USAREUR
R. H. Pate.....Ft. McClellan, Ala.
A. L. Smith, Jr.....Army Cml Ctr., Md.
C. M. Willoughby.....Ft. Riley, Kans.

Majors

A. J. Armstrong.....CmlC Fld. Reqt. Agy., Ala.
J. W. Benson.....D.A., Washington, D.C.
L. O. Elsaesser.....D.A., Washington, D.C.
G. B. Hoover.....Ft. Bliss, Tex.
N. H. Jones.....D.A., Washington, D.C.
E. E. Monk.....1st USA, N.Y.
P. P. Morton.....Ft. Houston, Tex.
A. R. Rausch.....Ft. McClellan, Ala.
R. A. Shade.....USMA, N.Y.
J. W. Startt.....Ft. Bragg, N.C.
A. E. Vernon, Jr.....Texas A&M, Tex.
T. T. Zerick.....Army Cml Ctr., Md.

Captains

G. M. Alter ..... Ft. Benning, Ga.
J. C. Jackson ..... Army Cml Ctr., Md.
S. H. Bass, Jr. ..... D.A., Washington, D.C.
W. E. King ..... Ft. Benning, Ga.
R. L. Bennett ..... CmlC R&D Comd.
E. A. Lloyd ..... R&D Lab., Md.
N. L. Bergeron ..... Ft. Jackson, S.C.
R. S. Malooley ..... R&D Lab., Md.
P. L. Boster ..... Ft. McClellan, Ala.
S. E. Martin ..... Tooele, Utah
J. L. Cline ..... Pres. San Francisco, Cal.
C. R. McDuff ..... Pine Bluff Ars., Ark.
C. L. Cunningham ..... Univ. Calif., Davis
J. P. McQuade ..... Ft. Bragg, N.C.
C. L. Duncan ..... Ft. McClellan, Ala.
D. P. Norton ..... Dugway, Utah
R. F. Dunn ..... Ft. Bragg, N.C.
A. Perez ..... Ft. McClellan, Ala.
R. F. Franz ..... Dugway, Utah
G. Perschetz ..... Cml Proc. Distr., N.Y.
D. A. Gelster ..... Ft. McClellan, Ala.
C. L. Predmore ..... USAREUR
R. N. Habermehl ..... Chicago, Ill.
F. V. Slocum, Jr. ..... Ft. Bragg, N.C.
L. N. Harris ..... NucDefLab., Md.
T. L. Smith, Jr. ..... USAREUR
W. J. Henderson ..... Ft. McClellan, Ala.
J. B. Speer ..... Ft. McClellan, Ala.
F. S. Henry ..... Ft. McClellan, Ala.
O. M. Thier ..... Ft. McClellan, Ala.
V. V. Yuas ..... R&D Lab., Md.

Lieutenants

L. F. Axtman ..... Ft. Campbell, Ky.
R. E. Snyder ..... Ft. McClellan, Ala.
A. A. Barry ..... Ft. McClellan, Ala.
P. A. Stynes ..... USMA, N.Y.
B. J. Conway ..... NucDefLab., Md.
W. L. White ..... Ft. Campbell, Ky.
D. E. Bivings ..... Ft. McClellan, Ala.

Retirements
May, 1961

Col. M. W. Reed ..... Washington, D. C.
Capt. F. Luban ..... Army Cml Ctr., Md.
Lt. Col. V. J. Kusebutzki ..... Washington, D.C.

Relieved from Active Duty
May, 1961

Maj. P. W. Hinman ..... Ft. McClellan, Ala.

WAC DIRECTOR VISITS DUGWAY—Colonel Mary Louise Milligan (center), Director of the Women's Army Corps, and Mrs. Floyd T. Abbott, Salt Lake City representative to the WAC, chat with Colonel David Armitage, Commanding Officer, Dugway Proving Ground, during Col. Milligan's visit to the U. S. Army Chemical Corps installation.

Col. Joseph C. Prentice (right), Director CBR Weapons Orientation Course, Dugway Proving Ground, Utah, points out a gun emplacement to five general officers who are attending the CBR school. (Left to right), Brig. Gen. Clarence B. Johnson, Jr., Hqs. 30th Armored Division (ARNG), Chattanooga, Tenn.; Major Generals Edward H. McDaniel, Inspector General, U.S. Army, Washington, D. C.; Clarence Pease, Headquarters 49th Infantry Division (ARNG), Alameda, Calif.; Harold F. Harding, Headquarters 83d Infantry Division (USAR), Cleveland, Ohio, and Brig. Gen. Walter D. Lamon, Jr., Hqs. 50th Armored Division, Artillery (ARNG) Trenton, N. J.

Major General Marshall Stubbs, Chief Chemical Officer, was guest speaker at the annual meeting of the Associated Church Press. Left is Rev. Alfred R. Klauser, executive secretary, and right is Rev. Edwin H. Maynard, president of the Association.

Capt. John R. C. Roop, Capt. Ali Durmis Simsir of Turkey, and Capt. Robert R. Knox, Jr. are plotting fallout predictions during a war games problem held at Fort McClellan. The exercise was based on the support of a field army in combat with nuclear weapons for a period of sixty days on the European continent.

The highest award given by the Department of Defense to civilian employees was presented to Dr. David Bruce Dill, Deputy Director of Medical Research at the U. S. Army Chemical Research and Development Laboratories, Army Chemical Center, Maryland.

Lt. Colonel Leon A. Kief, former Commanding Officer, U.S. Army CmIC Intelligence Agency, is congratulated by Major General Marshall Stubbs, Chief Chemical Officer after being presented the Army Commendation Medal at a ceremony held at Gravelly Point.

Dr. John A. Clements, a research scientists at the Army Chemical Research and Development Laboratories, has been named Maryland's "Federal Civil Servant of the Year" by the Federal Business Association, a group of federal officials from offices over the state.

Douglas E. Wislon, program coordinator in the U.S. Army Chemical Corps Field Requirements Agency, is congratulated by Col. Joseph S. Terrel, CO, on his promotion to CS-12.

Civilian Products Expected from Nine Billion R & D

Richard S. Morse, Assistant Secretary of the Army for Research and Development, estimates that the Federal Government will support scientific research and development to the tune of nine billion dollars in fiscal 1961.

His estimate includes 850 million for basic research, 600 million to increase research facilities and 8.5 billion for the conduct of research and development.

Three federal agencies, the Department of Defense, the Atomic Energy Commission, and the National Aeronautics and Space Administration, will administer 90 percent of these research funds.

Specifically, the Army's contribution for basic research is approximately 50 million dollars expended through more than 550 laboratories, universities and industries and 80 Army and other government installations. Part of the research is being conducted in 14 European countries and Japan.

Morse points out that in 30 months or less than three years from now economists have estimated that 14 cents of every dollar spent will be for products made by U. S. companies will be spent for things that are not being made today. He adds to this his own comment that 7 cents of the 14 cents will be spent for products which came into being as a result of research and development sponsored by the federal government.

Modern warfare, he states, is now a vast complex of activities, most of them with civilian counterparts, and while military and civilian research and development may differ, these activities are frequently identical or very similar.

In some cases, the transition from military to civilian application has been fairly direct. Civilian uses for synthetic rubber, developed out of World War II, required little civilian research. The entire civilian aviation industry, he pointed out, owes its present size to Defense funding.

The Army has, Morse said, the principal research and development effort in programming a communications satellite, and such a device will offer the world some of the most interesting applications of space in the years yet to come.

MARRIED

Barbara Anne Delmore and Lieutenant Michael McCahan Downes in the Chapel at the Army Chemical Center. The bride was formerly a member of the Broadway cast of "The Music Man," a graduate of the University of Georgia, and daughter of Brigadier General and Mrs. Fred J. Delmore. Her husband, who also graduated from the University of Georgia, is legal officer at Fort Benning.

GROUP AND SUSTAINING MEMBERS

OF THE ARMED FORCES CHEMICAL ASSOCIATION

Abbott Laboratories, North Chicago, Ill.
Adache Associates, Inc., Engineers, Cleveland, Ohio
Aerojet General Corporation, Downey, Calif.
Aircraft Armaments, Inc., Cockeyville, Md.
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Beckman Instruments, Inc., 2500 Harbor Boulevard, Fullerton, Calif.
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Continental Oil Co., Ponca City, Okla.
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Ethyl Corporation, Baton Rouge, La.
Evans Research & Development Corp., New York, N.Y.
Federal Laboratories, Inc., Saltsburg, Pa.
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Fisher Price Toys, Inc., East Aurora, N.Y.
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Food Machinery & Chemical Corporation, New York, N.Y.
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General Aniline & Film Corporation, New York, N.Y.
General Electric Company, Chemical & Metallurgical Division, Bridgeport, Conn.
General Tire & Rubber Company, The, Wabash, Ind.
Goodrich, B. F., Chemical Company, Cleveland, Ohio
Harshaw Chemical Company, The, Cleveland, Ohio
Harvey Aluminum, Torrance, Calif.
Hercules Powder Company, Wilmington, Del.
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Pittsburgh Chemical Co., Pittsburgh, Pa.
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Riegel Paper Corporation, 260 Madison Ave., New York 16, N.Y.
Shell Chemical Corp., Denver, Colo.
Shell Development Company, Emeryville, Calif.
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Shwayder Bros., Inc., Denver, Colo.
Standard Oil Company (Indiana), Chicago, Ill.
Stauffer Chemical Company, New York, N.Y.
Sun Oil Company, Philadelphia, Pa.
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United States Borax & Chemical Corp., 630 Shatto Place, Los Angeles 5, Calif.
Universal Match Corp., Ferguson, Mo.
Vitro Corporation of America, New York, N.Y.
Vulcan-Cincinnati, Inc., 120 Sycamore St., Cincinnati 2, Ohio
Wigton-Abbott Corporation, 1225 South Avenue, Plainfield, N.J.
Wyandotte Chemicals Corp., Wyandotte, Mich.

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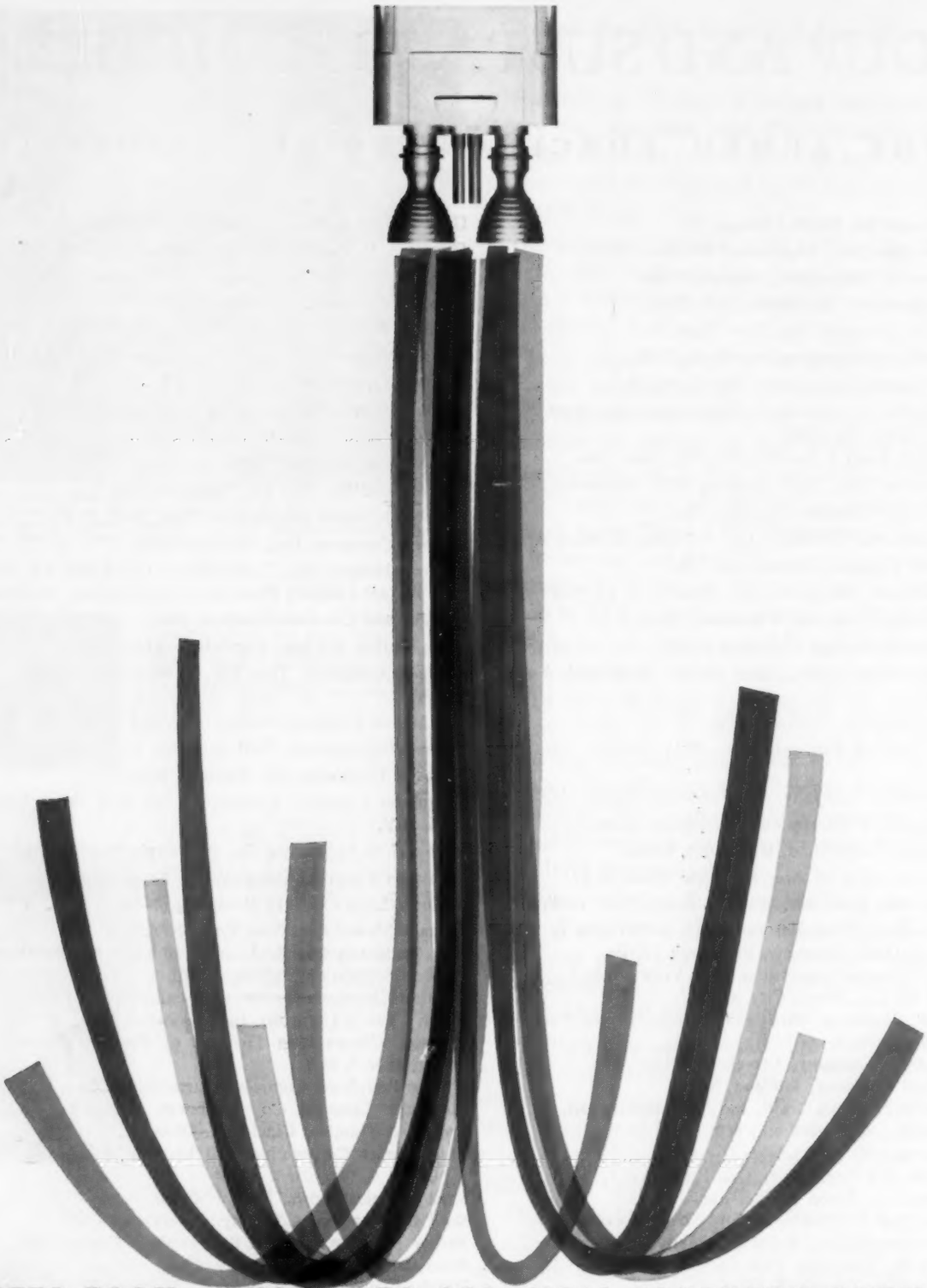

ROCKETS ZOOM...THANKS TO COLUMBIA-SOUTHERN CHEMICALS

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